

ANNUAL REPORT

OF THE

INDIAN CENTRAL COTTON COMMITTEE, BOMBAY,

FOR THE

YEAR ENDING 31st AUGUST
1935.

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Annual Report of the Indian Central Cotton Committee for the year ending 31st August 1935.

CHAPTER I.

As a result of one of the recommendations of the Indian Cotton Committee of 1918-19 the Indian Central Cotton Committee was constituted by the Government of India in the Department of Revenue and Agriculture in their Resolution No 404-22 dated the 31st March 1935. Its functions were originally purely of an advisory character but with its incorporation in the Indian Cotton Cess Act in 1923, funds were made available "for the improvement and development of the growing, marketing and manufacture of cotton in India". The Committee's functions are thus dual in character

subjects
air notice
des funds
large areas

where cotton is an important crop and for the extension and marketing of improved varieties of cotton. The research section of the Committee's work has passed the experimental stage, as will be seen in *Chapters IV and V* of this report.

The Committee further offers a common meeting ground for all branches of the cotton industry and all the main interests associated with cotton viz., the grower the ginner the exporter the millowner and the agricultural expert, are represented on it, its primary concern however, is the interest and welfare of the cotton grower.

PERSONNEL

2 A list of members of the Committee as it stood on the 31st August 1935 is given in *Appendix I*. Under the Indian Cotton Cess Rules members, who are not *ex-officio* members hold office for three years and one third of their number retire each year in rotation.

At its meeting in August 1935, the Committee recorded its appreciation of the work of its President, Dewan Bahadur Sir T. Vijayaraghavacharya, K B E., on the eve of his retirement, in the following Resolution —

"The Indian Central Cotton Committee has the honour to express its appreciation of the work of its President, Dewan Bahadur Sir T. Vijayaraghavacharya, K B E., on the eve of his retirement, in the following Resolution —

His consistent courtesy to each member and his unrivalled tact and patience in dealing with the various questions that were dealt with by the Committee have been an asset to the Committee.

The Committee records its best thanks to Sir T. Vijayaraghavacharya for the continued close attention he gave to details of the question disposed off during this period and it tenders him its best wishes on the eve of his retirement."

SUB-COMMITTEES

3 Most of the detailed work of the Committee is carried on by means of Sub-Committees and thereby much of its time is saved at its half-yearly meetings. The Committee is greatly indebted to the members of these Sub-Committees for the invaluable assistance they have given in furthering the work of the Committee and whilst it would be invidious to single out any for special mention, it feels that it did not record its expressions of appreciation and Local Sub-Committees by these Sub-Committees are called upon to attend meetings at much more frequent intervals than is the case with members of the other Sub-Committees.

The functions of the various Sub-Committees are detailed below and their composition as on the 31st August 1935 will be found in *Appendix II*

(a) *The Standing Finance Sub-Committee* is a statutory Sub-Committee and is the principal executive body of the Committee. By Resolution of the Committee one of the members of this Sub-Committee must be a representative of the cotton growers. Seven meetings of the Sub-Committee were held during the year.

(b) *The Local Sub-Committee* which met seven times in the year under report deals with all matters of a general nature, not involving finance which cannot be postponed for consideration to the half yearly meetings of the full Committee.

(c) *The Cotton Ginning and Pressing Factories Sub-Committee* is also a statutory body appointed to deal with matters arising out of the Cotton Ginning and Pressing Factories Act of 1925. It did not meet during the year.

(d) *The Agricultural Research Sub-Committee* ordinarily assembles half yearly during the meetings of the full Committee, reports on the progress made on schemes financed by the Committee, examines proposals for new schemes or extensions of those already in operation and considers the reports of research students.

(e) *The Technological Research Sub-Committee*, like the Agricultural Research Sub-Committee, generally meets during the half yearly meetings of the Indian Central Cotton Committee and considers all matters connected with the Technological Laboratory and Technological Research.

(f) *The Research Students Selection Sub-Committee*, as its name implies, selects students to whom scholarships or training grants are awarded for the purpose of undergoing training in research in the several sciences pertaining to cotton. One meeting of this Sub-Committee took place during the year.

(g) *The Sub Committee on Malpractices* was formed in order to deal with all references concerning malpractices and abuses which adversely affect Indian cotton. There were no matters during the year which necessitated a meeting of this Sub-Committee being called.

(h) *The Forecast Improvement Sub Committee* usually meets half yearly, its principal business being the improvement of the cotton forecasts of India.

(i) *The Special Sub Committee on Wider Markets* which met twice during the year was appointed in August 1933 with the object of examining the question of finding wider markets for Indian cotton.

(j) *The Standards Sub Committee* is concerned with the preparation for use in India of universal standards of certain growths of cotton dealt with in common both by the East India Cotton Association and the Karachi Cotton Association and of certain other varieties with which only the former Association is concerned. This Sub Committee which was constituted in April 1933 met five times in the year under report.

In addition to the above Standing Sub-Committees, Special Sub-Committees are appointed from time to time to deal with specific matters which do not fall within the purview of any of the other Sub Committees.

4. Whilst the Committee is representative of practically all sections of the cotton trade in India, it also enjoys the privilege of deputing representatives to serve on other bodies. Thus Sardar Rao Bahadur Bhimbhai Ranchodji Naik represents the Committee on the Imperial Council of Agricultural Research and on the Board of Directors of the East India Cotton Association the Committee is represented by three members Sardar Rao Bahadur Bhimbhai Ranchodji Naik, Mr N M Deshmukh and Mian Nurullah being its nominees in the cotton year 1934-35.

On the Joint Sub-Committee of search and of the Committee in ost of growing cotton, sugar cane represented by Sir Purshotamdas Thakurdas, Sardar Rao Bahadur Bhimbhai Ranchodji Naik, Mr J Vonesch, Mr Chunilal B Mehta, Mr Chumanlal G Parekh (representative of the East India Cotton Association) and the Secretary. Its representatives on the Institute of Plant Industry, Indore, are the President, (Dewan Bahadur Sir T Vijayaraghavacharya), Vice President, (Sir Purshotamdas Thakurdas), Mr Chunilal B Mehta, Mr Kasturbhai Lalbhai, Sardar Rao Bahadur Bhimbhai Ranchodji Naik, Mr S D Saklatvala, Mr J Vonesch, Mr G C R Coleridge, Rao Bahadur G R Kothare, Mian Nurullah, Dr W Burns and the Secretary.

In response to an invitation from the International Federation of Master Cotton Spinners and Manufacturers' Associations, the Committee appointed Dr W Burns and Mr W J Jenkins both members of the Committee, as its Congress which was held at Milan 1935. Only Dr Burns however,

MEETINGS

5 The Indian Central Cotton Committee held two meetings during the year under review, both at Bombay. The first meeting took place on the 4th and 5th February 1935, Mr H C Short, Commissioner in India, Lancashire Indian Cotton Committee, attending it as a visitor.

On the 19th and 20th August 1935, the Right Honourable Michael G C I E, M C, Governor of Bombay. Amongst the other visitors present were the Hon'ble Dewan Bahadur S T Kambli, J P, Minister for Education, Government of Bombay, the Hon'ble Khan Bahadur D B Cooper, Member for Revenue and Finance, Government of Bombay, Mr Kasturbhai Lalbhai, Pankore's Naka Ahmedabad, and Mr M D Williams of the British Cotton Growing Association (Punjab), Ltd, Khanewal.

A list of the more important resolutions passed at these two meetings will be found in *Appendix III*.

STAFF

6 Mr P. H. Rama Reddi held charge of the office of Secretary throughout the year.

The post of Deputy Secretary remained vacant.

Dr Nazir Ahmad held the post of Director, Technological Laboratory, during the year, and Mr R D Mihra that of Publicity Officer.

A temporary gazetted post of Personal Assistant to the Secretary was created for a period of one year in the first instance and Mr C J Bocarro, the Office Superintendent, was appointed to it.

The office staff continued to give its loyal co-operation, and I wish to record once again my appreciation of their help during the year.

PROVINCIAL COTTON COMMITTEES

7 The value of provincial cotton committees in dealing with problems of provincial importance has been emphasised in previous reports and it is gratifying to note that where such provincial committees have been functioning the work done by them has been of appreciable assistance to the Committee.

was transacted by them. It is hoped that the current year will see a revival of the activities of the other provincial cotton committees.

CHAPTER II:

WORK OF THE YEAR.

COTTON POLICY

8 THE year under review saw the completion of the Committee's investigations into the possibilities of growing long and medium staple cottons in the present short staple cotton areas of India. This investigation was the immediate result of the threatened Japanese boycott of Indian cotton in 1933

reference to the quality of the cottons grown, the factors limiting the growth of superior varieties and the characteristics of the cottons considered suitable for these tracts, the Committee came to the conclusion that for the Surti, Broach, Kumpta-Dharwar, Raichur, Tinnevelles, Cambodia, Gaorani, and Central Provinces and Berar areas, and the American tracts of the Punjab and Sind, suitable long or medium staple varieties were already on hand. In the Khandesh, Salems, Westerns and Northern, Cocanadas, Hyderabad Oomras and Malvi tracts types of cotton superior to the existing inferior local mixtures have been isolated or experiments were under way with a view to

grown in other tracts with similar climatic and soil conditions may prove successful in some of them. A solution of the problem confronting the successful growing of medium and long staple cottons in the Northern and Western tract may lie in the investigation into dry cultivation whilst a study of Persian cottons might solve the problem of the Dholleras tract. In the United Provinces the eradication of the pink boll-worm seems to be the first step required to be taken before any attempt is made to improve the quality of the cotton.

COMPACT BLOCK OF LONG STAPLE COTTON IN SIND

agreement with the Government of Sind that the purpose of the proposed legislation to prevent the growing of short staple cotton in the proposed block.

marketing. Whilst expressing its appreciation of the action taken by the Bombay Government, the Committee at its meeting held on the 19th August 1935 urged upon them the desirability of introducing such legislation as might be considered necessary to achieve the desired object if the measures contemplated by them proved inadequate, and also drew their attention to the serious danger to which the better quality cottons, capable of spinning 30's counts and over, grown in the proposed compact block were exposed by admixture not only with *Desi* but also 4-F American cotton which is suitable for 20's counts only. To obviate this danger it has been recommended to the Local Government that the proposed compact block should be reserved for growing only the pure types of long staple cotton distributed by the Agricultural Department and that the Cotton Transport Act should be applied to it to prevent the importation of *kapas* from outside the area for purposes of mixing.

MORNING BROADCAST OF COTTON PRICES

10. THE COMMITTEE MADE A REQUEST TO THE GOVERNMENT OF INDIA

India to
news per
station

morning broadcast of cotton prices was of considerable benefit not only to merchants and big cotton growers, some of whom had specially installed receiving sets in order to listen to the broadcast, but also to the general public, many of whom were coming through the radio before the broadcast was made. The Committee recommended that the Government of India should consider the possibility of making such a broadcast a regular feature of the early morning broadcast of cotton news, up country cotton markets also being benefited by the broadcast. The Committee also recommended that the Government of India should consider the possibility of making such a broadcast a regular feature of the early morning broadcast of cotton news, up country cotton markets also being benefited by the broadcast. The Committee also recommended that the Government of India should consider the possibility of making such a broadcast a regular feature of the early morning broadcast of cotton news, up country cotton markets also being benefited by the broadcast.

SPREAD OF GARROW-HILL COTTON IN THE CENTRAL PROVINCES

11. THE RAPID SPREAD IN THE CENTRAL PROVINCES OF GARROW-HILL COTTON, A VERY HIGH COUNT COTTON, IS A VERY INTERESTING PHENOMENON. THIS COTTON IS OF THE

accordingly recommended
growing and handling of
Berar would be effective

LANCASHIRE INDIAN COTTON COMMITTEE

would be found to be an acceptable effort on the part of that Committee to broaden and strengthen co-operation between India and the United Kingdom

of Indian cotton in Lancashire and assuring that Committee of its desire to co-operate to the fullest extent possible in matters affecting the interests of both bodies
the total takings
three years were —

	<i>Season</i> Bales	<i>Season</i> Bales	<i>Season</i> Bales
	<u>1934-35</u>	<u>1933-34</u>	<u>1932-33</u>
Total	<u>393,784</u>	<u>361,546</u>	<u>229,740</u>

THE COTTON TRANSPORT ACT

13 At the request of the Indian Central Cotton Committee the Government of India, in 1923, passed the Cotton Transport Act which enables local Governments to prohibit the import of cotton into any area within their jurisdiction. The Act was devised to prevent the import, for mixing and substitution, of inferior cotton into areas growing superior varieties.

Madras — There was no change in the protected areas in the Madras Presidency.

Bombay — The seven protected areas notified in the Bombay Presidency
the subject is under the consideration of the Local Government

Bengals cotton into these districts for the purpose of mixing
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Baroda, Indo
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MORNING BROADCAST OF COTTON PRICES

10. The morning broadcast of cotton prices was of considerable benefit not only to merchants and big cotton growers, some of whom had specially installed receiving sets in order to listen to the broadcast, but also to the agriculturist generally who often too coming through the radio before from telegraphic communication the villagers had even raised subscriptions for the purpose of getting a set. Furthermore by the discontinuance of entry cotton markets in the Central Provinces and Berar by them depended prices in New York, consideration of the

Government of India

SPREAD OF GARROW HILL COTTON IN THE CENTRAL PROVINCES

11. The rapid spread in the Central Provinces of Garrow-Hill cotton a very fine quality cotton, long with wool, This cotton is of the same quality as the cotton of the Central Provinces and Berar of superior quality and views of the

accordingly recommended that nothing short of a complete prohibition of the growing and handling of Garrow-Hill cotton in the Central Provinces and Berar would be effective.

LANCASHIRE INDIAN COTTON COMMITTEE

broaden and strengthen co-operation between India and the United Kingdom. Several members commented favourably on the report and considered it to be a valuable record of what was being done by the Lancashire Committee to popularise the use of Indian cottons in the United Kingdom. The Committee at its meeting in August 1935 passed a unanimous resolution appreciating the efforts made by the Lancashire Indian Cotton Committee to extend the use of Indian cotton in Lancashire and assuring that Committee of its desire to co-operate to the fullest extent possible in matters affecting the interests of both bodies. According to the Liverpool Cotton Association Weekly Circulars, the total takings of Indian cotton by the United Kingdom during the last three years were —

	<i>Season</i>	<i>Season</i>	<i>Season</i>
	Bales	Bales	Bales
	<u>1934-35</u>	<u>1933-34</u>	<u>1932-33</u>
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 ided during the
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THE COTTON GINNING AND PRESSING FACTORIES ACT.

14 Over a dozen cases of infringements of the Act were reported during the year to the authorities concerned. In some either the wrong year or indecipherable or incorrect marks were put on bales and in others, press marks were absent. In almost all cases warnings were given to the factory-owners. Where it was found that breaches were due to misunderstanding on the part of the factory-owners instructions as to the proper method of marking were issued to them and they were directed to be more careful in future. In one instance where the use of unauthorised weights was detected in a ginning and pressing factory and the only action taken was a severe warning to the factory owner by the Collector of the District, the attention of the Local Government concerned was drawn to the leniency of the punishment and they were requested to instruct trying officers to take a serious view of such offences and to inflict adequate punishment in future.

In December 1934, the International Federation of Master Cotton Spinners' and Manufacturers' Associations, Manchester, requested the Committee to press the Government of India for the re imposition of the rule requiring press marks to be indelibly stamped on the hoops of cotton bales, the reason stated being that the hessian covering of bales often got damaged or was cut out during sampling, thus making it impossible for the bales to be identified. The original rule requiring press marks to be stamped on the hoop was amended by the Government of India at the request of the Committee on the representa-

the Committee was unable to accede to the request of the International Federation

It is gratifying to note that on the whole the marking of bales in Indian States has proceeded satisfactorily. Legislation for this purpose and for the submission of weekly press returns is now in force in the following States —

Alipura, Alwar, Bahawalpur, Baroda, Barwani, Bhavnagar, Bhopal,

Weekly returns for cotton pressed were received from all the above States during the year, except Gwalior.

LICENSING OF GINNING AND PRESSING FACTORIES

15 Mention was made in last year's report of the request of the Committee to the Government of India for the amendment of the Cotton Ginning and Pressing Factories Act by the addition of a clause empowering local Governments to introduce the system of licensing ginning and pressing factories with the consent of their respective legislative councils. Such a measure it was hoped would provide an effective remedy for the various malpractices which were lowering the reputation of Indian cotton both in the country and abroad. The Government of India have since intimated their inability to undertake central legislation as desired by local Governments introducing Bombay and Central Provinces necessary legislation and it is hoped that as action taken by these Governments become apparent, other Provinces and States will not be slow in following suit. At present only the Hyderabad State has legislation of this character in force.

MALPRACTICES

16 The East India Cotton Association reported five cases of bales having been rejected as they contained watered cotton. These bales came from Hansi and Mandi Dabwali in the Punjab, Shegaon and Telhara in Berar and Navsari in the Bombay Presidency. Certified copies of entries in the press register pertaining to the bales in question were called for under Section 3 (3) of the Cotton Ginning and Pressing Factories Act and the information supplied was communicated to the East India Cotton Association.

An exporting firm in Karachi reported the rejection in Liverpool of bales of saw ginned Punjab-American cotton due to some of the bales having been badly damaged internally by water. A report was made to the Director of

practices should be avoided in future.

A complaint regarding oil spots in cotton from Bhatinda (Patiala State) received from a Bombay firm late in 1933 was reported to the Patiala State authorities. Intimation has now been received that instructions have been issued by the authorities to the effect that a warning should be administered to the factory owner.

A complaint received towards the end of 1933 from an exporting firm in Karachi regarding false packing and adulteration in bales received Dhuri (Patiala) was reported to the State authorities who recently informed that a warning had been given to the press concerned.

On receipt of information last year from a cotton exporting firm result of cut throat competition factory owners, to reduce their loss to the malpractice of mixing seed with cotton at certain places in

Provinces and in Central India, reports were made to the Director of Industries Central Provinces, and the Holkar State authorities for such action as they might consider feasible. In the Central Provinces, Commissioners and Deputy Commissioners instructed their subordinates to advise cotton traders and press-owners of the evils of such practices. The Holkar State authorities propose to check the practice of adulteration of cotton by the State.

cancellation of licenses for working the factory. The State also propose to carry on propaganda against such practices through the medium of cotton markets.

A complaint regarding the presence of abnormal quantities of seed in cotton from the Hyderabad State was received from a Bombay exporting firm and reported to the State authorities. This led to the issue of a circular to all ginning factories by the State drawing their attention to the serious consequences which such practices were likely to have on the prices of cotton in the tracts concerned and to the State.

Fa
in
given by them.

Reports were also received from the districts of the Central Provinces and Berar, that Rajputana cottons were being imported into the districts of the Central Provinces and Berar, and that these cottons were being mixed with the superior cottons of the Central Provinces and Berar.

Rajputana cottons were
Vimar and Hoshangabad
of being mixed with the
On information being sent to the
ply to the two
ct whereby no
The question
legislation on

Persistent complaints regarding the presence of seed in cotton in full pressed ball State has led to the suggestion that the State should report the names of the members and to this Commission.

The complaints were sent round to all local buyers.

BOMBAY COTTON CONTROL BILL.

17. The Cotton Control Bill, 1917, was introduced in the Legislative Assembly on 17th March 1917. The Bill was passed by the Assembly on 17th March 1917. The Bill was passed by the Assembly on 17th March 1917. The Bill was passed by the Assembly on 17th March 1917.

gain with a low type of cotton having high ginning percentage known as *Goghari* grown in the same area the Local Government have decided to

1027 *ALF* cotton to the detriment of the cotton growers of the tract affected

COTTON MARKETS

18 The establishment of regulated cotton markets under the Bombay Cotton Markets Act has not b the advantages of such mark only three markets ore each notified under the Act There appears to be some demand for regulated cotton markets at Malegaon Baramati and Dharwar and the question of opening similar markets at Surat Broach and Bijapur is also receiving the attention of the Commissioners concerned

District Local Boards and big *zamindars* in Sind do not appear to be aware of the advantages of regulated markets and propaganda to convince local opinion of the desirability of such markets would therefore seem to be necessary It has accordingly been suggested that an experimental cotton market should be established at a suitable centre either by Government or by co-operative agency in order to educate growers and to demonstrate the detailed working of a regulated cotton market

The Madras Government have finally published the Rules under the Madras Commercial Crops Markets Act measure of success attends this piece c far as cotton markets are concerned co and the Central Provinces

The question of undertaking legislation for the establishment of cotton markets in the Punjab has also been engaging the attention of the Local Government and the conclusion arrived at was that the problems of marketing required much closer study before the Local Government could attempt to embark on legislation An enquiry undertaken there revealed the existence of many evils the remedy for which the Local Government consider lay rather in the force of an enlightened and active public opinion than in the enactment of legislation

It is unfortunate that owing to protests on the part of the commercial community the Sangh State Commercial Crops Bill which was passed by the State Assembly could not be passed into law The previous Huzur Order regulating the sale and purchase of commercial crops continues therefore to remain in force

In the Baroda State rules under the Baroda Agricultural Produce Markets Act to which reference was made in last year's report have not yet been finally framed

UNIVERSAL STANDARDS FOR INDIAN COTTONS IN INDIA

19 In accordance with the procedure detailed in last year's report the Standards Sub-Committee passed the standards for the following varieties of cotton —

<i>Bengals</i>	<i>Oomras</i>
<i>Sind</i>	<i>Mathias</i>
<i>Punjab American</i>	<i>Broach</i>
<i>Sind American</i>	<i>Dholleras</i>

The reference set of standard boxes intended for the Committee were after being placed in hermetically sealed cases sent to Bangalore for storage

STANDARDISATION OF WEIGHTS IN COTTON TRANSACTIONS

20 Last year's report contained the information that only the United Provinces and the Central Provinces Governments had accepted in full the recommendation suggesting the adoption of the railway *maund* units of weights for cotton transactions. The Madras Government had prescribed only the railway *maund* of 82½ lb and the Madras Government the *khandy* of 784 lb. The Bombay Government were again requested to reconsider the question of standardising the Bombay *khandy* of 784 lb but they expressed their inability to accept the Committee's recommendation owing to the divergence of views expressed by the various important commercial bodies consulted. They added however that the regulations in force in the Presidency did not debar cotton transactions in *khandies* of 784 lb provided they complied with the provisions of the Bombay Weights and Measures Act by specifying in addition the exact equivalent of *khandies* in one or other of the standard weights 112 lb, quarters, cwt, etc.

Of the five principal cotton growing States addressed in this matter Gwalior has adopted the *maund* of 82½ lb and the *khandy* of 784 lb and Baroda the *maund* of 82½ lb. In Indore the *maund* of 82½ lb is the standard and legal weight all other weights being unauthorised. The Hyderabad and Mysore States are still considering the question.

REPRESENTATION ON THE INTERNATIONAL FEDERATION OF MASTER COTTON SPINNERS AND MANUFACTURERS ASSOCIATIONS

21 In order to deal more effectively with complaints arising abroad regarding faults often of a minor nature in Indian cotton which frequently received wide publicity through the publication of the proceedings of the bodies at which they were discussed the Committee considered it desirable to obtain

if possible representation on the International Federation of Master Cotton Spinners and Manufacturers Associations Manchester It is understood however that under the Federation's constitution the Committee is not entitled to ordinary membership and an application has accordingly been made for admission as an Associate Member The result* is awaited

MEANS TO PREVENT THE INTRODUCTION OF FOREIGN COTTON PESTS

22 *The Mexican Boll weevil (Anthonomus grandis)*—The restrictions imposed by the Government of India in 1925 on the import of American cotton into India continued in force without change during the year under review

and paid to importers in April and May 1935

23 *The Red (Sudan) Boll worm (Diparopsis castanea) and other pests*—The restrictions placed on the import of foreign cotton seed under Government of India Notification No 1213 Agri dated the 27th May 1930 in the Department of Education Health and Lands and the entire prohibition of the import of foreign *kapas* (unginned cotton) under Government of India Notification No 897 Agri dated the 24th July 1925 remained in force throughout the year Under these regulations two parcels of cotton seed were received for examination and fumigation during the year

COLLECTION AND SUPPLY OF INFORMATION

24 As in the past, notes on the progress made in the Provinces and Indian States on cotton and on the work of the Cotton Annual published by

PUBLICITY AND PROPAGANDA

25 A full account of the activities of the Publicity and Propaganda Department of the Committee will be found in the Annual Report of the Publicity Officer which forms *Chapter VII* of this Report

carried out in connection with the question of levying a cess to meet the cost

* Information has since been received that the Committee has been admitted to Associate Membership

† Appendix V

of the required heating machines, their installation, working expenses, etc., should it be decided to introduce control measures. A specially designed 10 colour poster was used with much advantage during the campaign.

Seven press communiqués were issued, four of which dealt with the development of cotton growing in Sind, the Bombay Presidency, the Central Provinces and the Coimbatore District of the Madras Presidency.

In addition to the issue of special articles and pamphlets from time to time, the Department participated in the exhibitions at Nanded organised by the Department of Agriculture, for use at the exhibition, at the request of the Government of Bombay.

PUBLICATIONS

26. The Committee receives partly on an exchange basis and partly by subscription a number of important scientific and technical journals which are circulated to research workers and institutions of the Committee. This

includes a perusing varied and up to date scientific literature, which might not otherwise be available to them.

The name of the Committee is on the free mailing list of a number of private and public institutions to whom the thanks of the Committee are due. Particular mention should be made of the British Cotton Industry Research Association for its Summary of Current Literature and the Shurley Institute Memoirs, the Empire Cotton Growing Corporation, the British Cotton Growing Association, the East India Cotton Association and the Karachi Cotton

Sciences, Calcutta the Academy of Science and other Associations and Chambers of Commerce which supply it with reports, statistics and other literature from time to time. The Committee is also on the free exchange list of the Imperial Council of Agricultural Research, the Imperial Institute of Agricultural Research, Pusa, and the Director-General of Commercial Intelligence and Statistics, Calcutta.

SECRETARY'S TOURS

27. During the year under review the Secretary visited Simla, Indore (twice), Lyallpur, Lahore, Madras, Coimbatore, Perindurai, Bangalore, Irwin Canal Farm, and Hyderabad in connection with the work of the Committee.

FINANCIAL.

28 In *Appendix VI* will be found a statement showing the Receipts and Expenditure of the year ending 31st March 1911. The expenditure to Rs 9,71,623 is 13,57,585, the principal items of savings being under the following heads —

Administration (Rs 28 063), Improvement of Cotton Marketing (Rs 12,584), Seed Distribution and Extension Schemes (Rs 1,06 575—three schemes sanctioned were held in abeyance), Printing and Propaganda (Rs 11,046), Technological Research (Rs 83 540), Surat Boll worm Clean up Scheme (Rs 7 000), Defibration of cotton seed, Bomba (Rs 4,716), Defibration of cotton seed, Masampheres and Physiological (Rs 21,626), Punjab Entomological (Rs 2 509), Punjab Entomological (Rs 8,910), Punjab White Fly (Rs 3 170), Punjab Physiological (Rs 15,264), Punjab Spraying Trials (Rs 2,736), Central Provinces Botanical (Rs 2,836), Sind Physiological (Rs 5,705), Hyderabad Botanical (Rs 1,185), Hyderabad Pink and Spotted Boll-worm (Rs 4,135), Bikaner Gang Canal (Rs 4 527), Baroda Root Rot (Rs 2 557) and Bengal Comilla (Rs 2,196)

At the suggestion of the Government of India, the following condition

the condition that there should be no objection to drawing on this balance in case of emergency, provided that such shortages are made good as soon as conditions improve

32 The scheme for the improvement of the cotton crop forecasts of the Bombay Presidency, sanctioned by the Committee in January 1934 for a period of two years in the first instance at an estimated total cost of Rs 11,694, completed its first year on the 15th June 1935. The investigations brought to light several sources of error in the compilation of Bombay cotton forecasts. It is particularly noteworthy that a very serious mistake, which regularly swelled the estimated yield of an Indian State by a lakh of bales was discovered and rectified during the year. In addition, the district standard yield figures which, for want of crop-cutting experiments, had not been revised for many years were examined in the light of other available statistics, and tentative revised yield figures adopted for West and East Khandesh districts, and Belgaum Bijapur and Dharwar districts. Further work is in progress. In the

33 Reference was made in last year's report to the efforts made by the Committee to obtain by local enquiries reliable estimates for the quantity of raw cotton annually used in India for such domestic purposes as hand-spinning and the making of quilts, mattresses, cordage, etc. The respective reports, except Hyderabad, submitted on the completion of these enquiries, were examined by the Cotton Forecast Improvement Sub Committee at its meeting held in August 1935. As the enquiry made in Bengal had failed to furnish the data necessary to arrive at a standard for village consumption in the non cotton growing tracts of Bengal and Bihar, the Committee deemed it advisable to conduct another enquiry in Bihar and sanctioned a sum of Rs 1,200 for this purpose.

34 It is highly gratifying to note that on the whole the subject of the improvement of the accuracy of Government cotton forecasts is receiving increasing attention at the hands of the authorities concerned, to whom an opportunity of meeting and discussing their problems is afforded by the half-yearly meetings of the Cotton Forecast Improvement Sub-Committee.

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proper has already been referred to. In British Punjab, crop cutting experiments are under way on a more extensive scale than before. Failing to get from the Punjab States an adequate response to the suggestion made to them for revising their estimates of yield, it has been decided to make use of the figures for cotton pressed for the purpose of estimating the crop of such States. The Central Provinces and Berar have advanced a step further in the collection of complete and reliable statistics to check the accuracy of their forecasts. Arrangements have been made from the commencement of the season 1935-36 to obtain from factories a weekly statement showing the quantity of cotton ginned together with information regarding its origin. Likewise monthly returns have now been arranged for, from every custom station on the borders of Hyderabad State, with a view to finding out the

quantities of *kapas* unpressed cotton and pressed cotton that are exported from each district in the State to each of the adjoining British districts. The question of the revision of the standard yield figures of Mysore State is also being examined by the Revenue Commissioner of the State.

35 As in the previous year a report on the estimated production during the season of Indian cotton of different staples was issued in May. With the ungrudging co-operation of the Agricultural Departments it was possible to give in this report more detailed information than had been possible before. Not only were the chief fibre characteristics of the different growths given but also the civil districts in which they were grown were specified. The criticisms received on this report show that the attempt is being appreciated by the trade and industry though the report is likely to be more useful to them by the introduction of a few more innovations in it. One suggestion received and already accepted by the Committee is that trade estimates of the crop should be given side by side with the Government estimates and an attempt will be made to give effect to this suggestion in the report to be published in May 1936 although owing to the dissimilar bases on which the two estimates are prepared the likelihood of reconciliation would appear to be somewhat remote.

36 *Press Statistics*—Ever since the passage of the Pressing Factories Act in 1925 all furnishing weekly returns of cotton collated by provincial authorities and

States had to be individually approached for necessary legislation providing *inter alia* for the establishment of press statistics. The Committee is gratified to be able to report now that its efforts have not been in vain and that all States addressed have fallen into line with British India in this matter the last of them—Gwalior—having signified its intention of compiling press returns from the current season.

The returns of cotton pressed during the season 1934-35 show that 3,444,781 bales were pressed in British India and 1,169,820 bales in Indian States making a total of 4,614,601 bales for the whole of India the corresponding figures for the preceding season being 4,045,516 bales, 1,286,317 bales and 5,331,833 bales respectively.

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however only be bridged if the press statistics referred to in the preceding paragraph are supplemented with information regarding the quantities of loose cotton (ginned but unpressed) taken directly into mills or used for

domestic consumption or for exports. In 1925, the Committee therefore brought to the notice of provincial authorities in the Punjab, the United Provinces, the Central Provinces and Berar, and Bombay the desirability of collecting these statistics from mills on a voluntary basis. They readily agreed and the figures relating to loose cotton received at mills in the major cotton growing provinces of British India are being compiled and published since 1926 (*vide Appendix VII*). It will be seen from these figures that mills situated in cotton growing tracts take considerable quantities of raw cotton in loose unpressed form.

In view, however, of the fact that the information now available is not complete even for the provinces for which they are collected, the Committee at its meeting held in August 1935 decided to recommend to the Government of India to amend the Rules under the Indian Cotton Cess Act by providing for the desired information to be shown in the monthly returns furnished by mills under the Act. Should the proposal be accepted, it is hoped that, with the co-operation of Indian States, the necessary figures would, before long, be available for the whole of India.

38 *Consumption*—The compilation and publication of the monthly statements* (1) of Indian cotton consumed in British Indian mills, (2) of Indian cotton consumed in mills in Indian States, and (3) a consolidated statement of (1) and (2) specially meant for publication in the daily Press were continued. For the first time in the history of the Indian mill industry the consumption of Indian cotton in India exceeded the limit of 2½ million bales and registered the record consumption of 2,612,132 bales against the previous record of 2,373,094 bales in 1929-30. Much of this rise is due to the substantial recovery of Bombay Island which is by far the largest consuming centre of Indian cotton.

The world's total consumption of Indian cotton too, increased from 4,772,000 bales in the previous year to 5,599,000 bales in the year ending 31st July 1935.

39 *Exports*—The exports of Indian cotton during the season 1934-35 were 3,115,420 bales of 400 lb as compared with 3,269,000 bales in the previous year.

40 *Stocks*—Accurate and reliable information regarding the stocks of raw cotton left in the country at the end of each season is as important to the cotton trade as it is to those on whom falls the task of checking forecasted production of raw cotton with the actuals accounted for at the close of the season. Except for the stocks held by the trade and the mills in Bombay this information had been lacking till 1933, when the Committee took this matter up and set to work to enlist the co-operation of various trade bodies, mills and cotton market committees in collecting the desired information. In the short period that has elapsed since this question was first taken up a considerable

part of the field has been covered, and it is hoped that, with an increasing appreciation of the usefulness of these statistics they will in due course be made more reliable and complete.

The information collected with regard to the stocks held on the 31st August 1935 is contained in *Appendix VIII*.

It may be mentioned here that for the very late crops, viz, Salems, Cambodias and Tinnevelles of the Madras Presidency, the season for which is taken to be the year ending 31st January, the Director of Agriculture, — — — — — to collect every year the stocks held on the — — — — — s, and by mills in the whole — — — — — ted under this arrangement is given in *Appendix VIII*.

41 *Demand for various types of Indian cotton*—Another useful line of enquiry undertaken by the Committee is the Indian mill and export demand for the various types of Indian cotton. In the changing conditions of the world, — — — — — and extent of the demand — — — — — demand from year to year — — — — —

The Statistical Leaflets Nos 3 and 4 (second issues) giving the results of the inquiry into exports and receipts at mills in 1934-35 are reproduced in *Appendices IX and X*

41A *Publications*—The following publications were issued during the year under report —

- (1) *Statistical Leaflet No 1 (Second Issue)*—"Report on the Staple Length of the Indian Cotton Crop of 1934-35 Season"
- (2) *Statistical Leaflet No 2*—"Stocks of Indian Raw Cotton held in India by the Mills and the Trade on 31st August 1934"
- (3) *Statistical Leaflet No 3*—"Receipts at Mills in India of Raw Cotton classified by Varieties—1933-34 Season"
- (4) *Statistical Leaflet No 4*—"Exports by Sea of Indian Raw Cotton classified by Varieties—1933-34 Season"
- (5) *Sta* — — — — — the Various

The last publication is an attempt, the first of its kind ever made to examine the supply and distribution of the various types of Indian cotton — — — — — publications. Thanks are — — — — — who kindly examined

CHAPTER IV.

RESEARCH

42 WITH the passing of the Cotton Cess Act in 1923, the Indian Central Cotton Committee was provided with funds for "the improvement and development of the growing, marketing and manufacture of cotton in India." The Committee carries out these objects by the establishment and direct control of the Technological Laboratory at Matunga, Bombay, and by offering subsidies to Departments of Agriculture and Co-operative Sale Societies in provinces and States for the investigation of some specific problems of economic importance and for the extension and marketing of improved types of cotton produced either by Departments of Agriculture or by the research financed by the Committee. In addition the Committee contributes annually a large sum of money to the Institute of Plant Industry, Indore, which is a central research station for cotton in the black cotton soils of Central India. The problems dealt with in provinces and States include many research schemes of more than local importance, viz, b
types of cotton by selection and hybridisation
tion of crop growth bud and boll shedding a

Imperial Council of Agricultural Research the economic enquiry into the cost of the cultivation of cotton sugar cane and their rotation crops in the principal cotton and sugar-cane growing areas of India. All research and seed extension and marketing schemes are, as they are received from the Directors of Agricultural Departments, first examined and approved by the Agricultural Research Sub-Committee before they are finally sanctioned by the Committee which keeps itself in close touch with the progress of their

funds during the year ending with the 31st March 1935, amounting to Rs 6,44,006 for research and seed distribution and marketing schemes in addition to the sum of Rs 4,92,328 sanctioned to the Technological

graduate training in India and abroad in subjects pertaining to cotton industry

TECHNOLOGICAL LABORATORY

43 The Annual Report of the Director, Technological Laboratory, forms Chapter VI of this report and it may be referred to for details. The work of the Laboratory, particularly of the spinning and yarn testing sections,

suffered to some extent during the year owing to the necessity of slowing down the processing of samples for over six weeks in order to allow the extensions to the spinning and yarn testing block and the replacement of some of the old blow-room machines with new up-to-date machines. This accounts for the decline in the number of samples and lots spun during the year as compared with last year. The samples tested during the year fell, as usual, under four classes, viz., (a) agricultural samples, (b) samples of standard Indian cottons, (c) Trade samples and (d) Technological samples. The agricultural samples represent mostly new strains which are still in experimental stage and some old types grown in connection with certain field experiments undertaken by agricultural officers in provinces and States. Of these experiments special mention might be made of the tests on 38F, 43F, Boss III and Sea Island cottons and on the effect of differential irrigation upon the fibre properties and spinning quality of cotton. The standard cottons consist of certain improved varieties which are now being grown on 15 per cent of the area. They include Umri Bant, 1027 A L F, Punjab-American 289F, Punjab-American 27 A L F, Gadag 1 (Dharwar-American), Cambodia Co 2, Sind Suahar, Sind N R, V 434, and Late Verum, and the results of the first nine types were published during the year in four-page circulars. The trade samples represent (a) the main types of commercial cotton which form the bulk of the Indian cotton crop and (b) the first arrivals of the new crop of cotton of a season. The object of these tests is to furnish information to the trade and mill industry regarding the quality of these cottons. During the year under review, 20 samples for the industry were tested and the results were published in 2-3 page circulars as usual. In addition to these tests the Laboratory undertakes on payment of certain fees laid down by the Committee tests on samples supplied by individual mills and firms in their private capacity and 39 such samples were tested during the year. The experiment started during

staple cotton, bales pressed to the weight of 289F, 1027 A L F, Jayawant and Cambodia course in sheds at Karachi was completed and the results were published in the open. The technological

high draft tests, tests of storage on seed cotton prior to ginning cottons and comparative tests on the machinery

The moisture testing section continued the tests on the moisture content of Indian cotton received in Bombay and in view of the adequate data obtained on these tests during the past three years a final report containing all the results was written up and submitted to the East India Cotton Association

INSTITUTE OF PLANT INDUSTRY INDORE

- 44 - The Annual Report for 1934-35 of the Director Institute of Plant Industry may be referred to for the
 Institute was opened in 1924
 cotton in the black soils
 grants contributed by the

Indian Central Cotton Committee and some of the States in Central India and Rajputana. The programme of the Institute includes the general botany, physiology and genetics of cotton in addition to a number of agricultural investigations relating to the cultivation of cotton and other crops. As decided last year a beginning was made for the general distribution of the two new types of *desi* cotton *Malvi 1* and *Malvi 9* which have been found to yield 20 per cent more than the local mixture. *Malvi 9* the better of the two is superior to local by 4 to 6 per cent in ginning and about 40 per cent in spinning. It has also been discovered in the course of the study of genetic variance in cottons that further improvement is possible in both *Malvi 1* and *Malvi 9* and that the latter is capable of greater improvement. *Cambodia* as compared with *desi* has been found a poor yielder on all soils in Central India with the possible exception of a few areas under tank irrigation and it does not therefore appear to have any future in Malwa unless it fetches a premium of 50 per cent. Experiments have been laid out for definitely ascertaining whether *Upland American* can hold its own against *Desi* in Malwa and if so by what means. The data obtained from the botanical survey of cottons in Malwa and Nimar reveal very interesting and important differences in survival value of different types and physiological work is being undertaken to find out the causes of the differences in plant response. The study of hybrids between *G. Africanum* and cultivated Asiatic cottons has shown that the normal chromosome complement of all plants so far studied is 26 but a few plants contain small islands of tetraploid tissue. Root studies on wilt have confirmed the indications obtained last year that the presence of

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in the first one foot below the surface have been found higher than around healthy plants. This is evidently due to the change in the physical condition of soil brought about by affected plants and the influence of this change on the aeration and activity of roots is obvious. The application of organic
 to improve
 nitrogen

GRANTS-IN-AID.

SCHEMES IN PROGRESS IN PROVINCES AND STATES.

MADRAS PRESIDENCY.

45 The *Herbaceum Scheme* was first started in 1923 with the object of securing from local *Uppam* (*G. herbaceum*) suitable types equal to *Karunganni* (*G. indicum*) in yield and spinning quality when grown under usual rain-fed conditions in Salem and Coimbatore districts where rainfall is low and often precarious. In years of good rainfall *Karunganni* gives a much higher yield than *Uppam* while in bad years the position is reversed, *Uppam* being a hardier variety, capable of giving a fair yield even in adverse seasons. The cultivator meets the situation by growing a mixture of the two varieties. The *Karunganni*

pure strains from *Uppam* that could spin above 20's were few and it was therefore decided in 1930 to secure by hybridisation what was found impracticable by pure line selection. The new line of work has now given some valuable results which are likely to prove to be of considerable economic importance. Two of the selections, viz., 4714 and 4801, from a cross between *indicum cernuum* and *obtusifolium* have not only proved to be pure for seed and lint characters but have given in comparative tests much better yields than all other strains with which they were compared. Selection 4714, the better of the two, has been back-crossed to both the parental types with a view to exploit the new technique of back-crossing. Some of the plants grown of X-rayed *Uppam* seed have developed some interesting peculiarities which will be studied next year.

object, provided it behaves in years of good rains in the same way as it did this year of insufficient rainfall. A few inter-varietal and inter-specific crosses have been back-crossed to both the parental types with a view to exploit the new technique of back-crossing. Some of the plants grown of X-rayed *Uppam* seed have developed some interesting peculiarities which will be studied next year.

On the 1st of July 1930, the scheme was started by the Cotton Specialist at Coimbatore. But due to the difficulty of securing the services of a competent plant physiologist the scheme had to be held in abeyance till 1930 when it was decided that two officers from the Madras Agricultural

work under the supervision of the Cotton Specialist. The scheme commenced formally in September 1931 when Messrs T R Narayana Iyer and S Kasinatha Iyer were sent for training in plant physiology and bio chemistry respectively. On their return after training the scheme was reviewed in February 1935 when it was decided to restrict its scope to the reduction of the shedding of flowers buds and bolls in *Karunganni* caused by untimely rains by breeding and physiological methods and devising control measures against the cotton stem borer. From the investigations carried out in 1933-34 it was noticed that the actual loss due to pemphres was only 4 per cent but the results obtained from the repetition of the same experiment during the year under report show that assuming the incidence of attack as 100 per cent the loss sustained in yield amounts to nearly 50 per cent — 20 per cent due to the death and the rest to the poor yield of affected plants. The eight American varieties *Gadag Bourbon Co 2*, *Buganda 9355*, *Durango Buri* and *U 4* which were tested during the year were found equally susceptible to the attack though they slightly differed in their resistance. A few crosses between *Co 2* and some South American types which were found resistant to the attack have been re-crossed with *Co 2* with a view to obtaining resistant types. On bio chemical side the regeneration of the tissue of the affected plant is confined only to a third of the larval gallery and is not begun till the pest is at least a fortnight old. It is however interesting to note that Peruvian cotton gums up so rapidly after the attack that insect responsible for the damage die out quickly. Three parasites a Braconoid and two kinds of Chalcids were observed attacking the borer in its grub stage but their damage did not exceed 1 per cent. The incidence of the pest was found considerably low in localities where the close period of cotton is longer than three months and also when sowings were put off by about three weeks in September the crop was free from the pest till January showing thereby that the pest could be easily brought under control if no cotton plants are left in fields for over three months between the harvest of the old crop and the sowing of the next crop of cotton. The preliminary investigations into the shedding of flowers buds and bolls indicate that boll retention is higher in *Karunganni* types than in *Uppam* and that cotton when mixed with black gram has less shedding than when it was sown pure.

47. *The Fodder Cholam Scheme* commenced in January 1931 with a view to ascertain the causes of the ' compared with *Cumbu* (Pen cotton in the Tinnevely dis

The work of the year under report was more or less a repetition of what had been done in previous years except that two new experiments were added.

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the exception of the one experiment on base exchange no other experiment gave any decisive result though the general trend was in the direction already indicated in previous years. The study of base exchange shows that while there is little difference between *Cholam* and *Cumbu* soils in the first layer

of six inches, the second and third six inch layers of *cholam* soils contain a

noticed, and a knowledge of the processes which bring out this change may prove very helpful in devising suitable ameliorative measures. *Cholam* does not appear to exhaust the soil fertility any more than *Cumbu* and neither deep ploughing nor the application of humus in the shape of sunhemp compost had any effect on *cholam* soils as could be seen from the low yields of succeeding cotton. The conclusion arrived at in previous years that, while *cholam*, when allowed to run into seed, seriously affected the yield of succeeding cotton, no such adverse effect was observed when it was cut at shot blade stage was once again confirmed. Attempts are being made to find a way to obtain a

growing, by thick sowing, by growing a mixture of *cholam* and one or more suitable pulse crops, by preventing *Cholam* plants from running into seed by cutting ear heads at the flowering stage and other means.

48. *The Nadam Cotton Breeding Scheme*, which commenced in February

for the stem-weevil and pink boll-worm during the close period of *Cambodia* resembled by the Madras District and for some other suitable for these
er Salem and
to *Cambodia*

cotton. The work of the year under report shows that there is a good prospect of securing an annual type which can replace *Nadam*. The season was very unfavourable with a low rainfall of 21 inches against an average of 30 inches. Sowings had to be delayed till the third week of October for want of timely rains and the total rainfall received throughout the growing period of cotton was only 4.35 inches. Even under these adverse conditions, three cultures of *Nadam*, nine of F 3 crosses of *Nadam* and *Karunganni* and thirty F 3 and F 4 crosses of *Cambodia* and U 4 were expected to yield about 200 lb of *kapas* per acre against about 80 lb of *Nadam* in the second year when highest

BOMBAY PRESIDENCY

superior spinning qualities to replace the local mixture which consists of a large percentage of *Goghari*, a rough and short staple variety susceptible to wilt but

with a high ginning outturn up to 40 per cent. In view, however, of the recent

four crosses, viz., (1) *B D 8* × *G A* 26-71 back crossed to *B L* 1 (second generation) and (4) *B D 8* × *G A* 1 in detail. Of the 66 families belonging to these crosses, 10 were free from wilt, seven with 1 to 5 per cent attack and in the rest the attack varied from 6 to 100 per cent.

during the year, 66 plants with 35 to 42 per cent ginning outturn and fibre length of 20 to 23 m m have been retained for further tests. Cross No 3 is a little susceptible to wilt but has good staple and medium ginning outturn. Forty-three plants of this cross with 35 and above ginning percentage and staple length of 20 to 23 m m have been selected for further study next year. Cross No 4 resembles *B D 8* a long staple variety with low ginning percentage, in height and fruiting and bearing. Its ginning made two parents. Fresh crosses have been made (i) *B D 8* and *NS 12* and (ii) *B D 8* and *NS 12*. Of the single line selections, *NS 12* has again proved satisfactory for wilt-resistance and other economic characters.

50. The *Upland Cotton Breeding Scheme* is the Branch scheme for

promising last year, were again found this year better yielders than *Banilla* and *NR 6* and did not suffer from the bad effects of continuous rains after sowing. They are also wilt-resistant and much superior to *Banilla* in fibre length. One of them, *NV 57-7*, is typically sympodial and matures earlier than the other two selections but it is slightly inferior in ginning percentage.

51. *The Scheme for Survey of Goghari Cotton in Gujerat* is a necessary corollary to the Committee's policy of encouraging exclusively the cultivation of *1027 A L F* in the tract lying south of the Nerbudda in Gujerat and to the seed scheme sanctioned in August 1934 for the extension of this cotton. The scheme has for its object the field survey of *Goghari*, an inferior short staple

wide distribution of *Goghari* either as pure or mixed crop. Gun-owners failed

to co-operate with the Department of Agriculture and it is intended to approach them once again next year through the Gujerat Divisional Cotton Committee and the East India Cotton Association Bombay

52 *Plant Puller Propaganda Scheme in Surat and Broach Districts*—This scheme is the natural consequence of the Surat Boll worm Clean up Scheme

of the food material till the next crop of cotton. The clean up scheme was y clean up measures the cul and on the termination of this in the first instance for one

season of the cotton plants. The of public le

result of this activity the Department of Agriculture could distribute in the North of the Nerbudda 1 282 plant pullers in addition to another 2 158 pullers sold by local merchants. In the south of the Nerbudda the demand for plant pullers was much greater and the Department of Agriculture could not obtain for this tract more than 1 536 pullers which were disposed of very quickly

80 per cent in Broach 90 per cent in 10 per cent in Jambusar Talukas in the it of the total area under cotton in the able area was thus left untouched due mainly to the new leases being delayed so late in the season that the incoming tenants has no time to pull out cotton stalks in time. To avoid this difficulty it is hoped that by the time the scheme terminates in June 1936

53 *The Scheme for Defibration of Cotton Seed* was sanctioned in August 1934. A defibration machine has since been purchased and installed at Palej Broach district and the machine will commence work in January 1936

SIND

The work of the year under report is mainly a repetition of what was done during the last year and the results obtained are in conformity with those of

of 2 75" each at 15 days interval and 5 irrigations of 2 75" each of 10 days

interval gives the highest yield. The manurial experiments also have given old or in two equal doses, one when the crop is $1\frac{1}{2}$ months old and the second two months later. Observations on 'red leaf' were continued. The experiments for finding out the optimum time for sowing were not repeated in view of the definite conclusions already arrived at.

PUNJAB.

55. *Botanical Scheme*—The chief object of this scheme when it was sanctioned in 1925 was to investigate into the causes of the periodic failures of American cotton in the Canal Colonies where a very large area is annually under this cotton and to obtain suitable types of American and *Desi* cottons to replace *4F* and *desi* cottons respectively. Efforts are, however, being concentrated from the beginning on the problem of breeding new types in view of their immediate economic importance and as will be seen below a separate

Department of Agriculture had decided to continue for one more year comparative tests between *43F* and *38F*, the two most outstanding strains,

parts of the province. Three other American strains, *54F*, *55F* and *58F*, have given promising results and they will be tested extensively in 1935-36. The *desi* type No. 39 which was issued last year for distribution has been spreading satisfactorily and two other *desi* strains are under severe tests

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57. *Pink and Spotted Boll-worm Scheme*—In January 1926, the Committee sanctioned a Pink Boll-worm Scheme for the investigation of the causes responsible for the difference in the incidence of the pink boll-worm between South-East Punjab where its attack is severe and the Canal Colonies where it is negligible. The scheme came to an end in March 1934 when it was superseded by the present Pink and Spotted Boll worm Scheme for the continuation of the work on pink boll-worm and the enquiry of certain aspects of the spotted boll-worm. The results obtained from the Pink Boll-worm Scheme have been given in previous reports and it will be seen from them that temperature and humidity are the main causes of the unequal distribution of the insect in the two areas. The work of the year indicates that the attack of the spotted

boll-worm is more severe in the Ca the rest of the province where th the year under report the spotted b middle of June when the new crop the tender shoots till about the beginning of September when it commenced attacking flower buds and green bolls. Its damage, as was observed from the experiments of night caging, amounted to 47 per cent in the case of 4F and 65 per cent in the case of desi. The degree of attack varied with the types of cotton and the time of sowing. In the Punjab there is a close period of cotton

etc. It is, however, interesting that for about six weeks of this period the only host plants available are the sprouts of cotton stumps and by removing them in time it may be possible to control the pest effectively. It is therefore proposed to start soon clean-up experiments over an area of not less than 150 square miles on the lines conducted in the Surat tract of the Bombay Presidency. Five parasites of the spotted boll-worm, viz, *Microbracon lefroyi*, *Malcha nurses*, *Rhogus testaceus*, *Elasmus sp* and *Chalies trachardiace*, were observed at Rhotak and Lyallpur and from the data collected it is noticed that a temperature in the neighbourhood of 82°F is optimum for the increase of *M. lefroyi* while above 95°F and below 55°F no development of the insect takes place. The duration of the total life cycle of this parasite which attacks both spotted and pink boll-worms varies from 7 to 51 days. Work on the other four parasites is in progress.

58 *White Fly Scheme* — White Fly (*Bemisia gossypiperda*) is a small sucking insect that does damage to cotton and other crops and was first observed at the British Cotton Growing Association's estate, Khanewal. In 1929 one of the Committee's scholars was deputed to study the insect and in 1930 the Committee felt convinced of the necessity of a more thorough investigation and sanctioned the White Fly Scheme which commenced in May 1931. During the year under report the white fly infestation was unusually low. As

the crop appeared to recover more or less completely. It was, however,

information for one month from the middle of July and from the middle of August gave the lowest ginning percentage and the lowest seed weight

respectively. The infestation was the lowest when the soil was treated with iron sulphate, but this treatment decreased, irrespective of the degree of attack, boll formation and ginning.

Infestation was comparatively low when iron sulphate and ammonium sulphate were applied as manure.

They had also very beneficial effect on the growth of the cotton plants in soils towards the end of June and to the beginning of July.

No relation seems to exist between the degree of infestation and the percentage of water content in the leaf except that *Mollisoni*, which contains the least amount of moisture, suffered the most. Irrigation experiments have, however, confirmed the previous indication that the attack is more or less in inverse proportion to the quantity of water applied to the crop. Observations were continued on the incidence of the pest on different host plants during the different parts of the year and the data obtained confirm the results of the last year.

59. *The Punjab Spraying Trials Scheme* is the outcome of the White Fly Scheme which has given a definite indication of the efficacy of certain insecticides against the white fly pest without causing any material damage to the cotton crop. The results of sprayings on small areas were misleading as the insect could fly to other areas and it was therefore necessary to obtain more definite indications.

The present scheme was designed with the object of ascertaining (a) the proper time and the proper time for spraying or dusting and (b) the various methods and appliances for the purpose.

given in last year's report. The trials were repeated during the year under report over an area of 2,640 acres at Khanewal, Okara and Sargodha. The insect proper time for spraying or dusting and the proper time for white fly attack.

American varieties are equally susceptible to this disease which is rapidly spreading in all irrigated areas of the Punjab and contrary to the indications obtained last year the incidence of the disease on irrigated cotton does not appear to have any relation to the number of irrigations. The disease appears to be less severe on cotton sown in the middle of June than on cotton sown earlier and neither *desi* nor American varieties suffered much when they were grown under rain-fed conditions. Root Rot, as explained in previous reports, is caused by two species of *Rhizoctonia*. Their attack is more virulent when

they act together than when only either of them is present and their activity is increased by the presence of subsidiary fungi (*Fusarium* sp. *Helminthosporium* sp. *Alternaria* sp.) though they are by themselves harmless. The two causal organisms are most active at 35°C and their parasitic activity declines with the fall in temperature. The thermal death point of both the resisting bodies and mycelia of the two organisms is also about the same. The disease, as observed during the year, is carried over from year to year on live cotton roots in the soil.

CENTRAL PROVINCES

61. *Botanical Scheme*—This is one of the oldest schemes sanctioned in 1923 and has for its fine spinning types of Provinces and Berar. It was therefore Verum This new variety soon became so popular with the cultivator, because of its high yield and the good premium paid for it that the Government in 1929 of the necessity of sar help of which the Department

prolific and superior in lint qualities besides being drought resistant and proved a great success during the year on an area of 2 000 acres under a wide range of conditions. It gave an average yield of 635 lb of kapas (seed cotton) per acre on the Al received from up to 37's and V. 262 and La khandy when respectively 1935-36 season where the rain was grown during the year on an area of about 16,000 acres and the results obtained were so satisfactory that it is expected to cover about 100,000 acres in the next season. V. 438 was extensively tested for its suitability for soils of lighter descriptions and the results were quite encouraging. Steps have been taken to extend this cotton on areas for which it has been developed. The scheme has yielded several other strains of distinct promise which require further testing.

62. *The Entomological Scheme* was commenced in June 1934 for a preliminary survey of the cotton boll-worm pest in the Central Provinces and Berar

where it has been doing considerable damage to cotton, with a view to ascertain its incidence, method of carry-over from year to year and the extent to which the results obtained from the Surat Entomological Scheme could be usefully applied in this province. The work of the year shows the presence of a much larger population of boll-worms at Akola

climate and higher c these centres the spotted boll-worm starts its attack on tender shoots when the crop is 3 to 4 weeks old and causes much damage to flower buds and green bolls from September onwards. The pink boll-worm, on the other hand, does not make its appearance till about September and its damage is negligible till the latter part of December by which time nearly 85 per cent of the crop is harvested. The pink boll-worm is not thus a serious pest in the Central Provinces and Berar though the combined effect of the two boll-worms is very severe towards the end of the season. The total loss due to the pink and spotted boll-worms is estimated, from the results of night caging experiments, at 51 per cent of the crop harvested. In addition only 77 per cent of cotton harvested is undamaged and of the rest, 20 per cent is made up of half eaten seed, the remaining 3 per cent being rendered useless. The spotted boll-worm is carried over from season to season by cotton plants left over in fields after harvest, tender shoots sprouted from cotton stubbles after hot weather showers, perennial cotton trees and several malvaceous plants. The method of carry-over of the spotted boll-worm is thus practically identical in the Central Provinces and Berar and the Surat tract of the Bombay Presidency where this pest was studied in detail for 8 years from 1923 to 1931. This shows that the only possible practical remedy for the spotted boll-worm lies in clearing up immediately after harvest of all cotton stalks and stubbles and the eradication of other malvaceous plants that harbour the insect. The pink boll-worm lives during the off-season in cotton plants left over after harvest, perennial cotton trees, unginned cotton, stacks of cotton stalks and soil cracks in fields.

UNITED PROVINCES.

63. *The Cotton Survey Scheme* was started in July 1933 for the detailed survey of the to facilitate growing area

were collected from as many as 1,852 villages in Rohilkhand and the best 396 of them were tested in 1934-35 for purity. Most of these samples were found to be crosses and were therefore discarded. From the few samples that appeared to be pure 443 plants were selected and examined for all be further tested during the year obtained from 1,101

communication was good and the Department of Agriculture had distributed pure seed. It was also observed that in places far away from towns and regular markets the crop on the whole was more homogeneous and better in staple than in other localities. Better types of cotton were seen growing in Mohoba *Tehsil* of Hamirpur district, Lauri *Tehsil* of Chatterpur State, Moth *Tehsil* of Jhansi district and Tehrauli *Tehsil* of Orchha State.

BURMA

61 *Cotton Improvement Scheme*—The local practices of dry cultivation in Burma are still so unsatisfactory that unless the cultivator is first taught the better methods of cotton cultivation there is little advantage of the distribution of the improved strains of cotton which the Department of Agriculture have been able to secure. The main object of the scheme is therefore to bring into general agricultural practice the up-to-date methods of cultivation by means of demonstration holdings in suitable centres and the scheme commenced in April 1931. The work of the year continued on the same lines as in previous

district and 311
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Drill sowing

1934-35 and a

large number of cultivators round about the demonstration holdings have adopted several improved methods such as the layout of fields, bullock cultivation, conservation of manure, etc.

HYDERABAD

65 *Botanical Research Scheme*—Hyderabad is the third biggest cotton

or have again
the control

appears to be most promising though it is slightly inferior to the rest in ginning percentage and to *Gaorani 6* in spinning value. It has staple over $\frac{3}{4}$ " long suitable for spinning up to 34 s. *Gaorani 4* and the next best strain *Gaorani 6* have also given very encouraging results in district trials and it is proposed to distribute their seed in the next season for about 1000 and 600 acres respectively. In another set of comparative tests between *Gaorani 9*,

Gaorani 12, *Parbhani 9*, *Havri 3* and *Parbhani local*, only one strain *Havri 3*, a *roseum* type, came up to the level of *Parbhani local* in yield. *Havri 3* and *Parbhani 9*, a *Banilla* type, gave higher ginning percentage while *Gaorani 9* and *Gaorani 12* had longer staple length than the rest. There were two other sets of preliminary comparative tests for the latest strains. Eight of these strains from one set and six from the other have been selected for further trials. Purity tests were as usual continued.

66 *The Cotton Survey Scheme* is a natural consequence of the above scheme and has for its object a detailed survey of the cottons grown in Hyderabad as an essential preliminary for the selection of suitable strains of cotton. It commenced in June 1931. During the year under report, 207 samples of cotton—119 of *Kharif* and 88 of *Rabi*—Medak, Nizamabad, Raichur, Karimnagar, districts and an examination of these *Parbhani* and *Rudroor Farms*, has shown crop grown in all the above districts co- and *G. hirsutum* with 1 to 8 per cent of *obtusifolium* var *Cocanada* and the *Rabi* type of *G. indicum*. The analysis of *Kharif* samples showed that in *Parbhani* District the bulk of the crop was *G. indicum* with *G. indicum* 15 per cent in the third year, 50 to 90 per cent in the second year, and other 10 per cent in the first year.

grown as the *Rabi* crop. The above analysis of the *Kharif* and *Rabi* crop agrees more or less with the results of the survey of standing crop carried out during the year in 147 villages of all the above mentioned districts.

67 *Pink and Spotted Boll-worm Scheme*—This scheme is the outcome of the work done by the Cotton Research Committee, which was played by the pink boll worm. This information the Committee felt convinced of the necessity of starting a detailed enquiry of these pests and sanctioned the scheme which commenced in June 1933 for finding out (a) the actual amount of damage done by them to cotton in the Godavary Valley, (b) the progress of their attack on the growing crop, (c) the mode of their carry-over from season to season and (d) the effect of the likely control measures. The work of the year shows that the spotted boll-worm is a serious pest in the Godavary Valley. The pink boll worm is a pest when all cotton is grown. The spotted boll worm is a pest in the rotation crop the two boll-worms are seen having passed over to the new cotton crop. In September and October the spotted boll worm increases in numbers at a much quicker rate than the pink boll worm but from November onwards the latter

have been made from some pure types and they will be further examined in the next season.

69. *Goghari Cotton Survey Scheme*.—This scheme which is similar to the *Goghari* cotton survey scheme in the Bombay Presidency was sanctioned in 1911 while 10 per cent *Goghari* mixture

BIKANER.

70. *T...* of cotton problems. definitely indicate that under the present agricultural conditions Cawnpore 520 (*desi* type) is best suited to the Gang Canal area and a beginning has been made to multiply this seed for general distribution. *Cawnpore 520* gives the while it responds favourably to green manuring.

CHAPTER V.

SEED DISTRIBUTION SCHEMES

71 THE Indian Central Cotton Committee felt convinced in 1929 that botanical and other research on cotton was of little consequence unless the results were made easily available to the cultivator and adopted accordingly the policy of helping the Departments of Agriculture and Co-operative Sale Societies in wider distribution of pure seed of the improved varieties of cotton. Sixteen seed schemes have since been sanctioned. Thirteen of them including the United Provinces C 402 Scheme which was started only in May 1935, are now under operation and one scheme for the sale of all farm crop produce in the Punjab was withdrawn during the year. The remaining two schemes *viz*, Bilhonga and Haveri have not yet been commenced for one reason or other though they were sanctioned as far back as in November 1929.

MADRAS PRESIDENCY

72 *Tiruppur Co 2 (Cambodia) Seed Extension Scheme*—The Committee sanctioned in 1929 a small scheme the Madras (Tiruppur) Seed Extension Scheme providing the pay of an officer to act as an advisor to a group of Co-operative Societies in Coimbatore District which had been interested in the distribution of Co 2 seed and the scheme started in May 1931. It was amalgamated in 1933 with a new seed scheme, Tiruppur Co 2 (Cambodia) Seed Extension Scheme sanctioned in August 1932 for the distribution of Co 2 seed in Salem and Coimbatore districts through the agencies of the Agricultural Department and the Tiruppur Co-operative Trading Society. The Department of Agriculture with the help of the Committee's grants arranges 6 000 acres while the Tiruppur to gin pure all the seed cotton he seed to cultivators for about n guaranteed its actual loss on seed transactions upto a maximum of 10 per cent of the capital invested for the purchase of seed and interest thereon at 5 per cent. The Department of Agriculture arranged during the year a seed farm area of 4 122 acres which yielded 1 106 700 lb pure seed. About a third of this quantity had to be discarded as it was found unfit for sowing and the rest was distributed for an area of about 29 600 acres.

73 *The H1 (G herbaceum) Seed Extension Scheme* has been suspended due to the difficulty of securing local co-operation in the supply of improved seed in the Bellary district. The question of a revised scheme is under consideration.

BOMBAY PRESIDENCY

74 *Hubli Seed Extension Scheme*—The main object of this scheme which came into operation in June 1930 is that every year the Department of Agriculture should maintain a total seed multiplication area of about 16,000

acres of *Jayawant* cotton and the seed obtained from this area should be purchased and distributed by the Hubli Co operative Cotton Sale Society for about 200 000 acres. The Committee has in its turn agreed to meet the cost of roguing the crop of the seed multiplication area and to pay the Society a subsidy not exceeding Rs 5 000 per year to cover its loss if any on its seed transactions and interest at 5 per cent on the capital invested for the purchase of seed. The Department of Agriculture has till now fully discharged its obligations by maintaining the seed multiplication area as stipulated in the scheme. The area covered by the Society however fell short of expectation

	Society
	acres

75 *The Gadag Seed Extension Scheme* is very similar to the above scheme except that the seed multiplication area required to be maintained in this scheme is 24 400 acres of *Gadag 1* cotton as against 16 000 acres of *Jayawant* in the Hubli Scheme and it commenced in June 1930. The area covered by the Gadag Society did not exceed 100 000 acres in any one year except in 1931-32 when it was 1 70 acres while the Department of Agriculture maintained an area for seed multiplication of 100 000 acres. The review enough seed for 90 250 acres

76 *Surat Seed Extension Scheme* — This scheme was first sanctioned in 1929 for two years and was extended in 1931 for another two years pending the final decision of the Committee with regard to its policy in Surat area. The Committee in January 1934 after full consideration of the merits of the two rival cottons *1A* and *1027 A L F* finally decided to confine its attention to the latter and extended the scheme for a further period of five years. The Department of Agriculture arranged during the year a seed multiplication area of 14 347 acres and distributed 1 506 225 lb of *1027 A L F* seed in Surat Broach tract besides supplying another 377 829 lb to the adjoining States of Chhota Udepur and Baroda. In addition the Hansot Co operative Cotton Sale Society distributed in the area served by it another 428 734 lb obtained from its members. It is gratifying that many Cotton Sale Societies which had been till recently opposed to the distribution of *1027 A L F* seed have now accepted the Committee's policy and purchased large quantities of this seed.

77 *The Khandesh Seed Extension Scheme* was started in May 1931 with the object of extending *Banilla* cotton a cross between *Bani* and *Comilla* cottons in the Khandesh area. This cotton is susceptible to wilt and has also suffered its defects however, It became therefore spread rapidly on its own merits and the Committee thought it desirable to sanction the scheme with a view to make this seed easily available in adequate quantities till a better strain is obtained from the Jalgaon Cotton Breeding Scheme. The

CHAPTER V.

SEED DISTRIBUTION SCHEMES.

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obtained from the above area and distribute the seed to cultivators for about 100,000 acres. The Society in return has been guaranteed its actual loss on seed transactions upto a maximum of 10 per cent of the capital invested for the purchase of seed and interest thereon at 5 per cent. The Department of Agriculture has been authorised to purchase a farm area of 4,122 acres which of this quantity had to be the rest was distributed for an

73. *The H1 (G. herbaceum) Seed Extension Scheme* has been suspended due to the difficulty of securing local co-operation in the supply of improved seed in the Bellary district. The question of a revised scheme is under consideration.

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acres of *Jayawant* cotton and the seed obtained from this area should be purchased and distributed by the Hubli Co-operative Cotton Sale Society for about 200 000 acres. The Committee has in its turn agreed to meet the cost of roguing the crop of the seed multiplication area and to pay the Society a subsidy not exceeding Rs 5 000 per year to cover its loss if any on its seed transactions and interest at 5 per cent on the capital invested for the purchase of seed. The Department of Agriculture has till now fully discharged its obligations by maintaining the seed multiplication area as stipulated in the scheme. The area covered by the Society however fell short of expectation every year for one reason or other. During the year under report the Society was able to distribute 1 462 861 lb of *Jayawant* seed enough for 146 286 acres the largest area covered by it since the beginning of the scheme.

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78 *Athani Seed Extension Scheme*—The object of this scheme which

Department and partly by the Hubli Cotton Sale Society. The total seed multiplication area expected to be maintained during the year according to the original programme was 11,100 acres, but due to the loss of cotton crop by floods last year and consequent dearth of pure seed, it had to be reduced to

27,650 acres

79 *The Deccan Canals (Banilla) Seed Extension Scheme* is practically self supporting unlike other seed schemes, its recoveries being expected to cover its entire cost. Under irrigation in the Deccan Canal area *Banilla* gives as high yield as local *N R* and brings a premium of about Rs 15 per 500 lb of seed cotton over the latter. The total area expected to be covered by this cotton is, however, only 30,000 acres. The Committee in 1934 considered the advantages of replacing *N R* with *Banilla* in this tract and sanctioned the scheme with a view to provide the cultivator with pure *Banilla* seed in

sowing on the farm next year

80 *Sind Cotton Extension Scheme*—This scheme was started in April 1931 with a view to introduce cotton cultivation in areas where this crop was not grown before and to extend improved varieties in localities where cotton had already been established. The work continued more or less on the same lines as in previous years on both the left bank and the right bank of the Indus. On the left bank the main items of work consisted of (i) comparative tests of improved cottons, (ii) trials of high quality cottons such as *Sea Island*, *Ashmouni*, etc, and (iii) multiplication and distribution of improved seed. In comparative trials the same four varieties that were tested in previous years, viz, 27 W N. or desi (36 ginning percentage, $\frac{3}{8}$ " to $\frac{4}{8}$ " staple length

highest average yield in Southern Jamrao and Eastern Nara tracts of Thar

Parkar district and in the northern part of Hyderabad district, while 27 IV N, closely followed by 289F-1, took the highest place in northern Jamrao tract, southern part of Hyderabad district and in Naushahro and Nawabshah Divisions of Nawabshah district. High quality cottons, *Ashmouni 37*, *Boss III-16* and *Sea Island 2-4* were tried in nine centres in Southern and Northern Jamrao tracts and the results surpassed even the highest expectations. The Department of Agriculture organised a seed multiplication area of 2 710 acres and distributed 785,335 lb of pure seed in addition to 411,430 lb distributed by the Sind Provincial Co-operative Bank. A very important feature of the left bank during the year was the keen demand for 289F-1 seed not only in Thar Parkar district where this cotton is extensively grown, but also in Nawabshah and Hyderabad districts where only *desi* types were hitherto under cultivation.

On the right bank cotton cultivation was unknown till 1931-32 when on starting the scheme a small area of 25 acres was for the first time brought under this crop. With this small beginning the area under cotton increased to 4,000 acres during the year and there is every prospect of this crop extending over a very large area. The results of the past four years indicate that 4F is better suited for the right bank than *desi* or any other cotton so far tested and that the soils of Dadu district are better fitted for cotton cultivation than those of Larkhana district which have been for a long time under rice cultivation.

CENTRAL PROVINCES AND BERAR.

81 *The Verum Seed Distribution and Marketing Scheme*—The main object of this scheme when it was started in September 1930 was to extend *Verum 202*, but on the expiry of the scheme in July 1934 the Committee in pursuance of its new policy to encourage wherever possible medium and long

5,277 *khandies* (4,137,168 lb) of pure seed were purchased and stocked for distribution in 1935-36 season. The Department of Agriculture were also able to arrange the sale of 5,750 bales of pure cotton at a premium ranging from about Rs 13.5 to Rs 90 per *khandy* of 784 lb over *Broach*, the average premium for the whole lot works out at Rs 62.3 over *Broach* and Rs 82 over *Oomras* on the basis of F O R Bombay.

82 *The U. S. L. S. C. S. C.* which came into operation in

the year amounted to 4 sowing only a small portion of this seed was sown on an area of 6 370 acres against 24 000 acres of the previous year. The Department of Agriculture made a serious effort to organise a large seed multiplication area but it ended

in disappointment for want of rains. They had therefore to depend once again on Hubli Gadag and Kopbal Cotton Sale Societies for their seed supply in 1935-36 season.

BARODA STATE

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ed enough for sowing on 20,230 acres including 15,382 acres. In Baroda as in other parts of from frost and the Department of Agriculture have made necessary arrangements to meet the demand for pure seed during the next season.

RESEARCH STUDENTS

84. Ever since its establishment the training of research worker in the various branches of science pertaining to cotton has been one of the Committee's principal concerns. Distinguished graduates are selected and placed for training under experienced research workers either on the Committee's schemes at the Institute of Plant Industry, Indore, at the Committee's Technological Laboratory or under Professors in Indian Universities. Sometimes scholarships are awarded to students for training abroad at recognised institutions. The term of scholarships is usually two years but extensions are sometimes sanctioned if found necessary.

Scholarships are awarded under two categories *viz* Training Grants and General Scholarships. The former are intended for Government servants who are recommended by provincial governments and for employees of the Committee who are considered suitable. General Scholarships are awarded to University Sub-Committee Research Students Selection advertisements are invited by

Fifty-two research scholarships and six training grants have so far been awarded by the Committee. Out of these one scholarship and four training grants were for foreign study. During the year under report eight research students were under training—three in India and five abroad. Only one scholarship was awarded during the year.

Expenditure on Research Studentships up to the 31st August 1935 amounted to Rs 243,145-2-4.

P. H. RAMA REDDI

Secretary

CHAPTER VI.

ANNUAL REPORT OF THE DIRECTOR, TECHNOLOGICAL LABORATORY, FOR THE YEAR ENDING 31st AUGUST 1935.

THE present report contains an account of the work done at the Technological Laboratory from 1st September 1934 to 31st August 1935. A notable event in the life of the Laboratory which took place during this period was the extension of several of its sections. The work of the Laboratory had grown steadily from year to year, during the past few years especially it had increased at a high rate. In order to cope with this increase in the work, it had become necessary to employ more staff and to install more machines and testing apparatus from time to time. As a result the Spinning Room, the Yarn Testing section and the Fibre Testing section had become overcrowded to an extent which threatened to lower the efficiency of the work. Moreover, the blow room plant of the Spinning Laboratory was installed more than 10 years ago. With the recent improvements in the design and construction of the blow-room machinery some of our machines had become obsolete. In view of the fact that the Indian Central Cotton Committee aims, on the one hand, at maintaining a high standard of efficiency in the work of the Laboratory and,

the blow-room machinery. Full details of the extensions carried out with these two objects will be found on page 66. The work done at the Laboratory will now, as usual, be described under the following five heads —

- I Spinning Laboratory.
- II Research Laboratory
- III Moisture Testing Section
- IV. Publications.
- V General

I SPINNING LABORATORY

The following statement gives a summary of the samples of different cottons tested at the Laboratory during the period under review together with the names of the suppliers of the samples :

BOMBAY.

- (1) *The Cotton Breeder, S M C, Dharwar* — 9 samples of Jayawant and other cross strains

- (2) *The Cotton Breeder, Jalgaon*—18 samples of Banilla, N R and local cottons.
- (3) *The District Cotton Overseer, Hubli*—One sample of Jayawant cotton
- (4) *The Principal Agricultural Officer, Padegaon*—9 samples from irrigation and soil experiments
- (5) *The Cotton Breeder, Surat*—4 samples of different strains and 4 samples of 1027 A L F and B D 8 mixings
- (6) *The Superintendent, Agricultural Station, Broach*—One sample of B D 8
- (7) *The Cotton Breeder, Broach*—Two samples of selections, one of Broach Local, and 3 samples of B D 8 and other strains
- (8) *The Cotton Breeder, Viramgam*—One sample of Wagad Local Wagad 8 and 3 selections and 4 samples of B D 8 and other selections
- (9) *The Officer in charge Government Seed Farm Mirpurkhas*—10 samples from irrigation and manurial experiments
- (10) *The Botanist in Sind, Sakrand*—One sample of 4F cross strain, 7 samples of Boss III, Sea Island and other strains
- (11) *Cotton Supervisor, Indus Right Bank, Dadu*—3 samples of 289F-1 and other strains
- (12) *Cotton Physiologist, Agricultural Research Station, Sakrand*—10 samples from irrigation and manurial experiments
- (13) *The Agricultural Chemist and Soil Physicist, Sakrand*—5 samples of 289F from irrigation experiments

PUNJAB

- (1) *The Cotton Research Botanist Lyallpur*—19 samples of different strains, 3 samples of 43F, Mollisoni and 289F
- (2) *The B C G A, Jhudo*—One sample of Sind L S S

UNITED PROVINCES

- The Economic Botanist to Government, U P, Caunpore*—7 samples of C 402 and 520 selections

CENTRAL PROVINCES

- (1) *The Economic Botanist for Cotton, C P, Nagpur*—3 samples of Ban and other selections and 5 samples of strains
- (2) *Superintendent, Government Farm, Akola*—One sample of Late Verum

MADRAS.

- (1) *The Cotton Specialist, Coimbatore*—Six samples from rotation experiments one of Co 2 and 3 strains, one sample of Khlay cotton
- (2) *The Superintendent, Agricultural Research Station, Koiapat*—9 samples of different strains and one sample of Uppam cotton
- (3) *The Farm Manager, Agricultural Research Station, Guntur*—7 samples of different strains
- (4) *The Assistant Director of Agriculture, Salem*—2 samples of Co 2

MISCELLANEOUS

- (1) *The Director, Institute of Plant Industry, Indore*—26 samples from multiplication sowing, manurial irrigation and other experiments, 5 samples of Malvi and other strains
- (2) *The Agricultural Inspector, Devangere*—One sample of Selection 69 and one of Local Sannahatti
- (3) *The Agricultural Inspector, Chitaldrug*—3 samples of Selection 69
- (4) *The Senior Assistant Botanist, Mysore State, Bangalore*—One sample of H 190, 3 samples of Selection 69 and 10 samples of different selections
- (5) *The Cotton Research Botanist Parbham*—10 samples of Gaorani and other selections
- (6) *The Agricultural Officer, Bikaner State, Ganganagar*—Three samples of Mollisoni from irrigation experiments
- (7) *The Crop Botanist Malwa Division, Ujjain*—10 samples of different selections
- (8) *The Inspector, Cotton Seed Distribution, Kopbal*—One sample of Jayawant
- (9) *The Officer in charge, Cotton Research Station, Baroda*—One sample of Broach 9

- (10) *The Second Economic Botanist, Bengal, Dacca*—One sample of Co. (Bengal) cotton
- (11) *The Director of Agriculture, Peredaniya, Ceylon*—One sample of Cambodia cotton grown in Ceylon
- (12) *The Senior Botanist, Bukalasa Experimental Station, Bomba Uganda*—8 samples of Uganda cottons

It may be mentioned here that after a considerable lapse of time a sample of Cambodia cotton, of which seed had been obtained from the Madras Presidency, was received from the Director of Agriculture, Ceylon, where it had been grown. Also, another sample of the same cotton was received for the first time from the Second Economic Botanist, Bengal, Dacca. The receipt of these two samples at the Laboratory indicates the efforts that are being made in India and in adjacent countries to extend the cultivation of medium staple cotton.

The following tables give the distribution of samples, lots and counts spun and tested at the Laboratory in each season since 1924—

TABLE I—*Distribution of Samples Spun, 1924-35*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	Total 1924-35
Bombay	18	26	22	22	28	66	89	69	143	111	87	600
Punjab	14	1			42	30	10	44	65	42	23	226
United Provinces	7		6	11	5	7	16	7	12	6	7	82
Madras	2	19	50	23	30	51	66	15	28	101	80	411
Central Provinces	2		3	2	2	6	3	3	5	9	9	44
Miscellaneous	3	11		6	6	27	28	33	75	97	85	371
Total	46	57	81	64	117	186	212	171	318	366	251	1860
Standard Cotton Tests	8	54	40	64	33	34	27	18	18	16	18	328
Trade Tests and Special Tests						37	89	134	120	166	131	666
Total Tests	54	111	130	128	150	257	328	323	461	548	400	2860

TABLE II—*Distribution of Lots Spun, 1924-35*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	Total 1924-35
Bombay	39	62	44	44	53	107	90	69	143	111	87	840
Punjab	26	4			83	41	10	44	65	42	23	322
United Provinces	14		12	22	18	14	16	7	12	6	7	157
Madras	4	39	100	46	60	85	66	16	28	101	80	557
Central Provinces	3		4	4	4	10	4	3	5	9	9	61
Miscellaneous	3	22		12	0	33	29	33	75	97	85	371
Total	86	116	162	128	227	290	213	172	318	366	251	2333
Standard Cotton Tests	31	176	142	178	68	64	54	36	36	32	36	850
Trade and Special Tests						37	119	166	129	175	175	882
Total Tests	120	292	304	306	225	391	338	394	493	543	462	4000

TABLE III—*Distribution of Yarns Spun, 1924-35*

Province	1924 25	1925 26	1926 27	1927 28	1928- 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35	Totals 1924-35
Bombay	103	152	132	132	159	322	203	203	430	332	292	2,510
Punjab	106	14			254	113	31	136	165	127	72	1,018
United Provinces	27		36	66	54	42	40	22	32	18	21	358
Madras	12	108	278	138	180	250	199	53	85	393	90	1,701
Central Provinces	8		18	12	12	30	12	9	15	27	29	170
Miscellaneous	3	58		36	27	99	100	93	227	203	250	1,188
Total	259	332	464	384	696	861	635	516	904	1,100	754	6,945
Standard Cotton Tests	90	514	423	447	290	223	309	136	200	180	204	3,021
Trade and Special Tests						80	343	502	256	499	810	2,490
Total Tests	304	846	887	831	906	1,164	1,287	1,154	1,410	1,779	1,768	12,456

It will be seen that as compared with the last year the total number of samples and lots spun in the Laboratory shows a decline, though the number of counts spun during the period under review is practically the same. The decrease in the number of samples and lots is due to the fact that for more than

be retarded in order to make provisions for equipment in the enlarged room. There was a small decrease in the number of samples spun.

be seen from Table I even this reduced number is in excess of those for all the previous years excepting the last two years.

include those small size samples and also the samples of yarn on which the former relate to strains

which are as yet in the early stages of experimentation and on which a fibre test is required by the cotton breeder in order to narrow down his field of selection so that he may grow in the subsequent seasons the most promising strains in quantities sufficiently large for a spinning test. A statement, giving a description of these samples, together with the names of the suppliers is given on page 56. The yarn samples are mostly received from mills or firms in their private capacity and are tested at the Laboratory on payment of certain fees laid down by the Indian Central Cotton Committee. A full schedule of the fees for the various tests which are performed for the benefit of mills and firms will be found on page 52.

The results of the tests carried out at the Laboratory are embodied in spinning test, fibre test and yarn test reports. These reports are sent to the suppliers of the samples, and in the case of agricultural samples submitted by the cotton breeders copies of the reports are sent to the officers. The results of tests, hereafter, will be found in the East India Cotton Association

which are
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under each
with the

corresponding numbers for last year —

TABLE IV—*Test Reports issued, 1924-35*

	1924 25	1925 26	1926 27	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35
Spinning Test Reports	7	19	19	22	21	63	92	60	87	121	112
Fibre Test Reports	1	1	5	1	7	4	7	19	30	18	19
Yarn Test Reports				1	4	4	2	3	5	3	7
Total Reports	8	20	24	24	32	71	101	82	122	142	138

It will be seen that as compared with the year 1924-25, the number of test reports issued in 1934-35 was

slightly less than that of last year as fewer samples could be spun owing to the work involved in the extension of the Laboratory

The strength of the permanent staff employed at the Laboratory from year to year since 1924 is given in the following table —

As at August 31st in	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
Technical Staff	8	11	20	24	27	27	32	32	32	33	34	34
Research Students	1	3	6	4	3	2	1	1				
Fumigation Chemists			2	4	2	2	2	2	2	2	2	2
Total	9	14	28	32	32	31	35	35	34	35	36	36

It may be mentioned here that in view of the large number of samples received for tests it was found necessary to employ two temporary Junior Testers for a period of four months each

CLASSIFICATION OF SAMPLES

The samples received for tests at the Technological Laboratory fall into the following four classes :—

- Agricultural samples
- Standard Indian cottons
- Trade samples
- Technological samples

We shall now describe briefly the work done under these four heads

samples are received from the cotton
are engaged in the work of improving
They mostly represent strains which

of special mention

report was very carefully considered by the Technological Research Sub Committee and it was decided that as this investigation had yielded interesting results it should be continued and that the results so far available should be published. In the current year samples for this purpose have been received from Lyallpur, Coimbatore, Sakrand, Ganganagar and Padegaon.

(2) *Uganda cottons*—It will be remembered that for the last three years the Technological Laboratory has made tests on samples of improved variety of Uganda cottons submitted by the Department of Agriculture, Uganda.

provided for testing 16 instead of 8 samples. This request was considered by the Technological Research Sub Committee at its meeting held in August 1935 and it was decided that as in the past 8 samples may be tested free of charge but that for any additional samples the usual fees should be charged.

(3) *Tests on 38F and 43F*—These two strains are further selections from Punjab American cotton and have been under trial at Lyallpur for some years past. Having given very satisfactory results on the farm it was decided to try them out in the cultivators' fields in order to see which of these two strains would be more suitable for general cultivation. Accordingly, about 20 samples of these two strains were received and tested at the Laboratory and reports embodying the results of fibre tests and spinning performance were sent to the Department of Agriculture, Punjab.

(4) *Tests on Boss III and Sea Island*—These are two long staple cottons which are under trial in the new Barrage area in Sind. During the past six years that they have been tested at this Laboratory they have given very satisfactory results and yarns ranging from 60 s to 80 s of satisfactory evenness have been spun from them. As it is possible that the cultivation of these cottons may be extended in the near future, rather more detailed tests which

included the spinning of carded and combed yarns were made on them in the current year. For purposes of comparison a sample of Egyptian Giza 7 was obtained and treated in the same manner and the results for the Sind cottons were compared with those obtained for Giza 7. A report containing the results of these experiments was sent to the Agricultural Department, Sind.

(b) *Standard cottons*—As in the past detailed spinning and fibre tests were made on the standard Indian cottons of the last season. These cottons represent certain improved varieties, which are now being grown to the extent of 15 per cent. of the total area under cotton cultivation in India. This year four new varieties were included among the standard Indian cottons. Two of these came from Sind, where as a result of the development of the Sukkur Barrage, the area under cotton cultivation is increasing at a considerable rate. These two cottons have been named "Sind Sudhar" and "Sind N R". The former is an improved type of Sind American and represents the long staple cotton which will be extended in Sind in the future. The latter is a selection from the Sind-Desi type, which has been selected for general cultivation in Sind on the basis of its stand in the field, yield, ginning percentage and colour. The other two new standard cottons are further selections of C. P. Verum 262 and are named "V 434" and "Late Verum". The former is specially suited to areas where the rainfall is irregular, while the latter is specially suited to areas in which the monsoon is likely to continue late in the season. These cottons have been tested in the past at the Technological Laboratory and besides possessing the above mentioned advantages have given, on the whole, even better results than Verum 262.

As most of the standard cottons are a public property. During the year under review 4-page circulars were published on the following nine cottons—

- 1 Umri Bani
- 2 Verum 262 (Nagpur)
- 3 Verum 262 (Akola)
- 4 Punjab-American 289F
- 5 Punjab-American 4 F
- 6 Jayawant (Kumpta)
- 7 Surat 1027 A L F
- 8 Gadag 1 (Dharwar-American)
- 9 Cambodia Co 2

(c) *Trade samples*—(1) As in the past spinning tests were made on samples of trade varieties which form the bulk of the Indian cotton crop. These samples are tested in accordance with the arrangements between the

Indian Central Cotton Committee on the one hand and the East India Cotton Association Bombay and the Millowners Associations of Bombay and Ahmedabad on the other. The cotton samples supplied by the East India Cotton Association under

season while those supplied are of the early arrivals

first hand information to the trade and the industry regarding the waste of these tests are not only the results of the same variety

in the previous seasons. Thus these circulars not only furnish information regarding the performance of these cottons in the current season but they also enable one to find out whether a given variety is maintaining its quality or is showing signs of deterioration. In view of the practical value of these tests it has been decided to publish these circulars collectively in the form of a bulletin. The following statement gives the description of trade samples tested during the period under review.

Cottons supplied by the East India Cotton Association —

1	C P No 1	14	Westerns (Jhaveria)
2	Berar	15	Farm Westerns
3	Khandesh	16	Coompta
4	Nanded	17	Upland (Gadag)
5	Lattur	18	Bijapur
6	Muttia	19	Bagalkote
7	Punjab American	20	Cambodias
8	Broach	21	Tinnevely
9	Jagadia Farm	22	Karungannis
10	Surat	23	A R Kampala
11	Navsari	24	A R Busoga
12	Dholleras (Wagadia)	25	A R Jinja
13	Kalagin		

Cottons received in accordance with the arrangement made with the Millowners Associations of Bombay and Ahmedabad

BOMBAY

1	Hansi (Bengal)	11	Shedbal (Miraj)
2	Saudha (Khandesh)	12	Farm Westerns
3	Ujjain (Central India)	13	Broach
4	Padtur (Moglai)	14	Bailhongal
5	Mandsaur (Ujjain)	15	Tiruppur Cambodia
6	Hubli Compta	16	Karunganni
7	Hubli Upland	17	Nandyal
8	Surat	18	Northern Cambodia
9	Cambodia	19	A R Kampala
10	Guntakal (Westerns)	20	A R Busoga

AHMEDABAD

Nil

A list of the Technological Circulars issued on these samples will be found under Publications

In addition to these tests of which the results are published for general information and firms in samples were for spinning

of wax content, one for fibre maturity and two for determination of blow room loss These tests are undertaken on payment of certain fees laid down by the Indian Central Cotton Committee which are reproduced below

SCALE OF FEES

	Rs a p
(1) Fibre or Yarn Test—	
(a) Mean fibre-length	7 8 0
(b) Fibre-weight per inch	7 8 0
(c) Fibre strength	10 0 0
(d) Lea Test	7 8 0
(e) Ballistic Test	7 8 0
(f) Single Thread Test	7 8 0
(g) Twist	7 8 0
(2) Fibre and Blow room Test—	
(a) Fibre tests—As for (a)—(c) above	
(b) Blow room only	10 0 0
(3) Full Test—	
(a) Fibre tests—As for (a)—(c) above	
(b) Spinning test only	35 0 0
(c) on combed cotton	50 0 0
(1) Variety of cotton (broad classification)	25 0 0
(5) Identification of fibre (microscopic test)	15 0 0
(6) Percentage of size	7 8 0
(7) of grease	7 8 0
(8) of free acid	15 0 0
(9) Presence of mildew	7 8 0
(10) Causes of mildew growth	30 0 0

Rs. a. p.

(11) Percentage of immature fibres—

(a) In lint or kapas	..	..	..	10	0	0
(b) In yarn or cloth	..	.	..	15	0	0

(12) Wax content—

(a) 1 Sample	..	..	.	..	12	8	0
(b) 2 Samples	..	.	..	.	22	8	0
(c) 3 Samples	..	..	.	..	30	0	0
(d) Each additional sample					7	8	0

(13) Determination of mechanical injury to fibre. 10 0 0

(14) Tests in addition to the ordinary 3 roller system 10 0 0 per system.

(15) Cloth Samples—

(a) Actual counts	.	.			15	0	0
(b) Actual twist	..	.			20	0	0
(c) Single thread strength					20	0	0

(16) Moisture Tests—

(a) 1 Sample	.	..	.	..	5	0	0
(b) 2 Samples		.	.	.	7	8	0
(c) 3 Samples	.	.	..		10	0	0
(d) 4 Samples					12	8	0

(2) *African cottons*—It will be recalled that during the last three years

was considered in June last by their Special Appeal Committee on African cottons, who made their recommendation regarding the standards of length for these cottons to the Board of the Association on the basis of this report

(3) *Effect of artificial watering on the spinning quality of cotton*—These tests have been in progress for some time with the object of finding out the effect on spinning quality of the addition of a known quantity of water to cotton before it is pressed into a bale. For this purpose, the two cottons selected were Amraoti and Broach (Palej) and for each cotton a number of bales containing different quantities of water added to them before pressing were prepared, samples were drawn from these bales from time to time and subjected to fibre and spinning tests. During the period under review the results for the

(4) *The effect of different degrees of compression on the spinning quality of cotton* — It was originally the intention to make tests on two cottons namely Superfine Oomra and Punjab American 289F with a view to finding out whether and to what extent the spinning quality of cotton is affected by the degree of compression in a bale. The tests however could only be made on Superfine Oomra and the results of these tests were considered by the Technological Research Sub Committee in February 1st. It was felt that the effect of compression if any would be more pronounced in the case of the comparatively long staple cottons. It was accordingly decided that these tests should be performed on Punjab American 289F Surat 1027 A L F Jayawant and Cambodia. Bales pressed to the same size but weighing nearly 400 300 and 200 lb of the four above mentioned cottons have been purchased and the necessary tests will be made in due course.

(5) *Deterioration of cotton stored in the open and in shed at Karachi* — During the period under review this investigation was also completed and a report containing the results and the main conclusions was placed before the Technological Research Sub-Committee at its meeting held in August last. The Committee decided that the results were highly interesting and that as they showed that cotton stacked in the thole yard definitely suffered both in grade and spinning performance a copy of the report should be sent to the Karachi Cotton Association with the recommendation that they should request the Karachi Port Trust to provide more godown facilities at Karachi.

(d) *Technological Samples* —

(1) *Limit spinning tests* — In order to study the effect of insertion of twist on the strength been undertaken with American 4F which pliers ranging from 3½ to 5½. This investigation is in progress.

(2) *High Draft tests* — The Laboratory has already issued two Bulletins on the results of application of high draft spinning to Indian cottons. Since the publication of the last Bulletin some more systems of high draft spinning have been acquired by the Laboratory and accordingly another investigation has been undertaken in order to extend the scope of the former work. For this purpose mixings of two Indian cottons have been spun on five systems of high draft spinning in addition to the ordinary system. This investigation is in progress.

(3) *Effect of balanced and unbalanced drafts on mixings* — For the purpose of this investigation mixings were made in different proportions from P.A. 289F with P.A. 4F, Mollison with P.A. 4F and Kampala with P.A. 4F. Suitable

hank rovings prepared from these mixings were spun with balanced and unbalanced drafts into identical counts and the yarns were examined for strength evenness elasticity etc This investigation was completed during the period under review and an account of it will be published in the form of a Technological Bulletin

(4) *Effect of storage of seed-cotton prior to ginning*—During the period under review this investigation was completed and the results were published in a Technological Bulletin a summary of which will be found on page 64 The Technological Research Sub Committee while considering the report of the work on this subject decided that these tests may also be performed on Wagad 8 and Punjab American cottons with the storage period increased to about 4 months

(5) *Combing of good-quality Indian cottons*—It was stated in one of my previous Annual Reports that an investigation was undertaken at the Technological Laboratory to find out the limit spinning performance of four good quality Indian cottons when these had been combed to the extent of 20 per cent and 30 per cent Alongside of the spinning of fine counts from the combed cottons both on the ordinary system and a high draft system the comber wastes obtained from these cottons were mixed with low quality cottons and were spun into relatively coarse counts During the period under review an account of this investigation was written up and published in the form of a Technological Bulletin a summary of which will be found under Publications

(6) *Comparative tests on the effect of change in the blow room machinery*—It has been mentioned above that during the period under review the blow room plant of the Laboratory was overhauled some old machines were discarded and new machines were installed As one of the primary functions of

results of yarn tests on these samples when available will yield the necessary correction factor if any which should be applied as a result of the alteration in the blow room plant

II RESEARCH LABORATORY

Fibre Testing Section—It is customary at the Laboratory to determine the principal fibre properties of all the agricultural samples on which spinning tests are carried out Besides this fibre tests are also made on the standard Indian cottons as well as on the samples which are tested at the Laboratory

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Microscopy Section—*Mr A N Gulati*—It was stated in one of the previous Annual Reports that an investigation was undertaken at this Laboratory in order to study the relationship between the fibre maturity and the degree of yarn neppiness of a cotton. For this purpose a large number of cottons were selected and were examined for the percentage of mature half mature and immature hairs. During the period under review an account of this investigation was published in a Technological Bulletin, a summary of which will be found under 'Publications'. Mr Gulati also continued his investigation on the bacterial and fungoid growth in connection with the deterioration of Broach cotton. For this purpose, he prepared cultures in special media of the various micro organisms which were found associated with this cotton and was successful in isolating and identifying most of them. Arising from the examination of the Broach cotton stored for nearly a year, he observed a new type of bacterial infection of which no mention appears to have been made by any of the earlier workers on this subject. In this type of infection the bacteria, instead of merely puncturing the walls of the fibre, were found to feed upon the secondary cellulose, working their way gradually along the length of the fibre. Mr Gulati took several photographs showing this type of bacterial infection and an account of these observations has been sent for publication in the Indian Journal of Agricultural Science. It should also be stated that, in addition to the above work, Mr Gulati examined numerous samples for fibre maturity in connection with the routine work of the Laboratory. It is now proposed to hand over the fibre maturity work to the Fibre Testing Section as a part of their normal activity.

Dr L Thoria joined the staff of the Laboratory on 1st May 1935. He began work on the possibility of the utilisation of the short staple cottons for the manufacture of artificial silk and staple fibre. For this purpose, Dr Thoria prepared second —

III MOISTURE TESTING SECTION

In view of the fact that in the last three years sufficient data has been collected with regard to the average moisture content of Indian cottons received in Bombay at different times of the year and its variation in the dry and the wet season, only 26 samples were subjected for moisture tests during the period under review. These samples included 7 from the Appeal Committee of the East India Cotton Association, 4 from trade bales and 15 in connection with the Laboratory investigations. The total number of samples so far tested

Appeal Committee of the East India Cotton Association, was written up during the period under review. This report was considered by the Moisture Tests Sub Committee of the Association who made their recommendations for standards of moisture to the Board of the Association.

IV PUBLICATIONS

The following is a list of Technological Bulletins and Circulars issued during the period under review —

I Technological Bulletins, Series A, Nos 26 and 27

- (1) Technological Bulletin, Series A, No 26 "Technological Reports on Standard Indian Cottons, 1934" by Nazir Ahmad, M Sc, Ph D, F Inst P
- (2) Technological Bulletin, Series A, No 27 "Combing of Good Quality Indian Cottons" by R P Richardson, F T I, and Nazir Ahmad M Sc, Ph D, F Inst P

II. Technological Bulletins, Series B Nos 19 and 20

- (1) Technological Bulletin, Series B, No 19 "Effect of Storage Prior to Ginning on the Spinning Quality of Cotton" by Nazir Ahmad, M Sc, Ph D, F Inst P
- (2) Technological Bulletin, Series B, No 20 "Fibre-Maturity in Relation to Fibre and Yarn Characteristics of Indian Cottons" by Amar Nath Gulati, M Sc, and Nazir Ahmad, M Sc, Ph D, F Inst P

III Technological Circulars Nos 150 to 195, as under —

Circular No	Title	Date of publication
150	Spinning Test Report (No 514) on samples of A R Kampala A R Busoga and A R Jinja cottons 1933 34	September 1934
151	Spinning Test Report (No 515) on samples of Bijapur cotton 1933 34	September 1934
152	Spinning Test Report (No 516) on samples of Upland cotton 1933 34	September 1934
153	Spinning Test Report (No 517) on samples of Karun	ber 1934
154		er 1934
155		er 1934
156		1935
157		1935
158		y 1935

Circular No	Title	Date of publication
159	Spinning Test Report (No 560) on samples of Berar cotton 1934 35	February 1935
160	samples of Khandesh	February 1935
161	samples of Khandesh	February 1935
162	on samples of Moglaj	February 1935
163	Spinning Test Report (No 568) on samples of Bengals cotton 1934 35	February 1935
164	Spinning Test Report (No 570) on samples of Ujjain (Ujjain) cotton 1934 35	February 1935
165	Spinning Test Report (No 571) on samples of Ujjain (Mandsaur) cotton 1934-35	February 1935
166	Spinning Test Report (No 577) on samples of Hubli Kumpta cotton 1934 35	March 1935
167	Technological Report on Gadag 1 (Dharwar American) 1934 35	April 1935
168	Spinning Test Report (No 582) on samples of Latur cotton 1934 35	April 1935
169	Spinning Test Report (No 583) on samples of Nanded cotton 1934 35	April 1935,
170	Spinning Test Report (No 584) on samples of Muttha cotton 1934 35	April 1935
171	"	June 1935
172	"	June 1935
173	"	June 1935
174	"	June 1935
175	Spinning Test Report (No 596) on samples of Broach cotton 1934 35	June 1935
176	Spinning Test Report (No 597) on samples of Karun ganni cotton 1934 35	June 1935
177	Spinning Test Report (No 598) on samples of Tiruppur Cambodia cotton 1934 35	June 1935
178	Spinning Test Report (No 599) on samples of Northern Cambodia cotton 1934 35	June 1935
179	Spinning Test Report (No 600) on samples of Farm Westerns cotton 1931 35	June 1935
180	Spinning Test Report (No 601) on samples of Westerns cotton 1934 35	June 1935
181	Spinning Test Report (No 602) on samples of Miraj cotton 1934 35	June 1935
182	Spinning Test Report (No 603) on samples of Nandyal cotton 1934 35	June 1935
183	Spinning Test Report (No 604) on samples of Surat cotton 1934 35	July 1935
184	Spinning Test Report (No 606) on samples of Tiruppur Cambodia cotton 1934 35	July 1935
185	Spinning Test Report (No 607) on samples of African Busoga cotton 1934-35	July 1935

Circular No	Title	Date of publication
186	Spinning Test Report (No 608) on samples of Kampala cotton 1934 35	July 1935
187	Spinning Test Report (No 609) on samples of Hubh Upland cotton 1934 35	July 1935
188		July 1935
189		July 1935
190		July 1935
191	Spinning Test Report (No 613) on samples of Farm Westerns cotton 1934 35	July 1935
192	Technological Report on Jayawant (Kumpta) cotton 1934 35	August 1935
193	Technological Report on Cambodia Co 2 (Cambodia 440) 1934 35	August 1935
194	Spinning Test Report (No 620) on samples of Navsari cotton 1934 35	August 1935
195	Spinning Test Report (No 621) on samples of Upland cotton, 1934 35	August 1935

The following is a summary of Technological Bulletins, Series A, No 27 and Series B, Nos 19 and 20 —

(1) *Technological Bulletin, Series A, No 27 "Combing of good-quality Indian Cottons"*—The present bulletin describes the results of combing tests carried on four good quality Indian cottons, namely, P A 289F, Cambodia Co 1 Nandyal 14 and Surat 1027 A L F. These cottons were combed on a Nasmith Comber to the extent of 20 per cent and 30 per cent (27 per cent in the case of 1027 A L F for the higher degree of combing). The resulting slivers were spun on the ordinary and a high draft system of spinning into counts much finer than those permissible for the carded material. The comber wastes in each case were mixed in the proportion of 1 : 3 with a low quality cotton grown in the same province and the good quality cottons and the mixtures thus obtained were spun into suitable counts on the ordinary system. The behaviour of each sample during spinning was noted and the yarns obtained were examined for evenness, neppiness and strength. In the course of this investigation 103 different spinnings were carried out giving rise to 1 004 bobbins for tests. The number oflea tests performed amounted to 4,957, that of ballistic tests 4,870 and that of single thread tests 10,040, making a grand total of 19 867 tests for yarn strength alone. Besides these the low quality cottons, the comber wastes and the carded and the combed slivers of the good quality cottons were subjected to fibre tests for the determination of mean fibre-length, fibre-length irregularity and fibre weight per inch. From a consideration of the results of all these tests the following conclusions are arrived at —

1. The mean fibre length of the combed material for each of the four cottons, was either equal to or only slightly higher than that of the carded

material The process of combing, therefore, even to the extent of 30 per cent did not bring about a large increase in the mean fibre-length of any of these cottons

2 The process of combing on the other hand, was remarkably effective in reducing the fibre length irregularity of these cottons The improvement in this direction was most pronounced in the case of the cotton (P.A 289F) which had the highest value of fibre length irregularity Thus, the combed cottons were only slightly longer but much more regular in length than the carded cottons

3 The 20 per cent comber waste was found, in each case to be about 15 per cent shorter than the cotton from which it was extracted Its fibre-length irregularity percentage was however, independent of the cotton being nearly 24 in each case The 30 per cent comber wastes were on the whole somewhat longer and less irregular in length than the 20 per cent comber wastes but unlike the latter their mean fibre-length did not bear any straightforward relationship to that of the cotton nor their fibre-length irregularity was confined to a narrow range

4 The hair weight per inch of the comber wastes was either very nearly equal to or a little higher than that of the carded material depending upon the botanical variety of the cotton

5 Yarn breakages on the ring frame were on the whole less on the high draft than on the ordinary system thus making it possible to spin within the economic limit finer counts on the former system

6 The process of combing considerably reduces though does not completely eliminate neppiness in cottons in general and is most effective in the case of such cottons as P A 289F which ordinarily give rise to neppy yarns

7 When the low quality cottons were mixed with the comber wastes, the yarns obtained from the mixtures were in each case more neppy than those spun from pure cottons though in no case were they so neppy as to be unserviceable Besides the neppiness content of a cotton and a comber waste other factors such as the capacity of the two to mix together operate in determining the neppiness of the yarns obtained from the mixture

8 The system of spinning ordinary or high draft made no difference to the degree of neppiness of the yarns

9 Though the yarns spun from the combed cottons were much finer than those obtained from the carded cottons they were, on the whole quite satisfactory from the point of evenness

10 The high draft system gave more even yarns than the ordinary system the improvement in this respect being more marked in the carded than in the combed yarns

11 The effect of a comber waste in determining the evenness class of yarns spun from its mixture with a pure cotton depends upon the spinning quality of the former as compared to that of the latter. Where the two are very nearly equal, the yarns spun from the mixture are just as even as, or only very slightly less even than, those obtained from the pure cotton. Where, on the other hand, the waste is of a definitely poorer quality than the pure cotton, the yarns obtained from the mixture are appreciably less even than those spun from the pure cotton.

12 Combing to the extent of 20 per cent. made a very considerable

was found that for these four cottons at least the percentage improvement in spinning quality followed the order of the mean fibre length of the cottons

marked in the finer than in the relatively coarser counts
 Ided stronger yarns
 ver, was more pro-
 It was also more

14 In the case of three cottons the beneficial effects of (1) combing to the extent of 20 per cent. and (2) spinning on the high draft system were found to be additive, while in the fourth case in which the effect of the 20 per cent. combing alone was very large, it was not the case.

15 Whereas combing to the extent of 20 per cent. raised the capacity of these cottons to spin into finer counts by a very considerable amount, combing to the extent of 30 per cent. did not in all cases confer a benefit commensurate with the additional loss of 10 per cent. fibres. The use of the higher degree of combing may not, therefore, prove an economic proposition in every case. As to when combing should be advantageously pushed up to 30 per cent. and when it should be left at 20 per cent. depends upon the system of spinning employed and the variety of cotton under test. In connection with the latter point, it was found that if 20 per cent. combing produced very large improvement in the spinning quality of a cotton, combing to the extent of 30 per cent. did not appreciably raise its spinning performance. If, on the other hand, the initial improvement resulting from 20 per cent. combing is not so large, there is room for further improvement in spinning quality by extracting 30 per cent. fibres.

16 20 per cent. combed cottons spun on the high draft system gave very nearly the same results as those obtained for the 30 per cent. combed cotton spun on the ordinary system. Thus, where the high draft system used in these tests is or can be made available, it would be more economical to comb the cotton only to the extent of 20 per cent. and employ the high draft system in their spinning rather than push the combing to 30 per cent. and use the ordinary system.

17 The main causes for the very considerable improvement in the spinning of other than a more combed material

18 Employing a special technique no difficulty was experienced in obtaining yarns from mixtures of comber wastes and low quality cottons. In the case of three cottons the yarns spun from the mixtures were somewhat weaker than those given by the pure cottons showing that comber waste was poor in spinning quality than the pure cotton. In the fourth case the yarns spun from the mixtures were just as strong as those obtained from the pure cottons.

19 Only in the case of one cotton—P A 289F—the yarn strength results of the 30 per cent comber waste mixture were definitely better than those for the 20 per cent waste mixture. In the case of the other three cottons the differences in yarn strength between the two waste mixtures were generally not large.

(2) *Technological Bulletin Series B No 19 Effect of storage prior to ginning on the spinning quality of cotton*—The object of this paper is to describe the results of an experiment carried out specifically with the object of ascertaining the effect of storage on the spinning quality of the cotton. The results already been traversed by other workers. The three cottons selected for these experiments are improved varieties grown in the Punjab and are called Punjab American 289F Punjab American 4F and Mollisoni.

It was found that storage of cotton seed for a period of four weeks has no effect whatever either on the spinning quality or on the strength of the cotton fibre. The results of these tests on the spinning quality of the cotton fibre continue to be confirmed. Similarly the other view that during storage oil migrates from the seed into the fibre is not confirmed by the results of wax determination. Only in the case of one cotton P A 289F the wax content of the stored sample was found to be significantly higher than that of the fresh sample.

The results of the spinning test show that the yarns spun from the sample of P A 289F which was stored before ginning for four weeks were stronger and more even than those given by the early ginned sample. This feature again was not shared by the other two cottons. Similar results for the two types of sample cotton—Mollisoni—where the stored sample had the advantage.

Thus in the case of two cottons storage of seed cotton before ginning did not bring about any improvement whatever in fibre-properties wax content or spinning performance while it held the possibility of severe loss due to bacterial deterioration. In the case of one cotton only a small improvement in wax content and spinning performance was observed but it would be rash to regard it as an argument in favour of delaying the ginning operation and to ignore the harmful effects of storage upon the quality of the seed and lint. If by force of circumstances it may become necessary to store the seed cotton for a while before ginning every precaution should be taken to ensure that the sample is dry that it does not contain large quantities of dirt or trash and that the atmosphere in the store-room is neither particularly warm nor humid. If the period of storage should exceed a few weeks the seed cotton should be occasionally taken out and exposed to sun.

(3) *Technological Bulletin Series B No 20 Fibre Maturity in Relation to Fibre and Yarn characteristics of Indian cottons* —The present report contains an account of an investigation undertaken with the object of determining the effect of season locality of growth heredity etc on the fibre-maturity of Indian cottons the relationship of the latter with the mean length fibre weight per inch and fibre strength of these cottons and its influence on the neppiness and strength of the yarns spun from them.

The technique employed in these tests is described in detail. The following conclusions are drawn from an analysis of the observed data —

(1) Different cottons behave differently in regard to the effect of season on fibre maturity in some the maturity is subject to seasonal fluctuation in others the season has very little effect.

(2) The locality of cultivation has a pronounced effect on the degree of fibre maturity of Banilla cotton.

(3) Selections from the same common parents grown under similar conditions may differ significantly in regard to fibre maturity.

(4) The saw gin does not exercise any selective action on the immature or half mature fibres. If as in the present case the saw ginned samples are found to give more neppy yarns it is possibly due to the rolling up of the short bits into which some of the longer fibres may break during their passage through the gin.

(5) Fibre maturity did not yield a significant simple correlation with mean length but detailed analysis shows that a majority of short staple cottons possess high percentages of mature hairs while a majority of the comparatively long staple cottons are characterised by low percentages of mature hairs.

(6) High fibre maturity goes hand in hand with high fibre weight per inch and high fibre strength the simple correlation coefficients between the two attributes being +0.60 and +0.72 respectively. The mature fibres

SPINNING LABORATORY

Spinning Master —R P Richardson F T I

Spinning Assistant —N Iyengar

Electrician —Herculano Lobo L E E

Clerk —D C Mullan

Yarn Testing Section —

Statistician and Personal Assistant —V Venkataraman M A

Senior Testing Assistant —H B Joshi B Sc

Junior Testing Assistants —G D Bhide B Sc K V N Nayar V
N Modak B Sc L V Sundararaman B A P S Sambamurthi G J
Kharkar B Sc A J Farid U K Benegal B A P V Nachane B Sc
A B Khan B Sc

Statistical Clerks —R Krishna Iyer P K Wagle

DIRECTOR'S OFFICE

Head Clerk —M T Majmudar

Stenographers —M T Sundaram M A Marar

Laboratory Keeper —H P Sethna B Sc

Mr R P Richardson Spinning Master proceeded on leave out of India on the 10th September 1934 and returned to duty on the 11th January 1935. During this leave period Mr N Iyengar Spinning Assistant was appointed to officiate as Spinning Master.

Mr M M Patke Instrument Maker resigned his post from the 15th February 1935 and this post was filled up by the appointment of Mr J B Kharas on a revised scale of pay. Mr Kharas joined the Laboratory on 18th February 1935.

In order to cope with the increased work in the Fibre and Yarn Testing Section, two Senior Testers were created up by Messrs G Hurry and 10th December 1934.

On 10th April 1935

Junior Research Assistant on a revised scale of pay. Dr Sen joined his duties at the Laboratory on the 17th May 1935.

Mr K S Marar, Junior Tester, who was appointed Technological Assistant, Sakrand, was relieved on the 30th April 1935 to join his new post and his post was filled up by the appointment of Mr C S Ramanathan, who joined the Laboratory on the 4th June 1935

Mr K G Deo was transferred to Lyallpur as Officiating Technological Assistant to relieve Dr K R Sen. He worked there till relieved by Mr. S

G Deo, who reverted to his substantive post of Junior Tester in the Laboratory.

Mr M A Gangat, Junior Tester, resigned his post on the 22nd May 1935, Bombay, who joined

In connection with the investigation on the possibility of the utilisation of short staple cottons for the manufacture of artificial silk and staple fibre, a temporary post of a Chemist was created for one year and Dr L Thoria was appointed to this post. He joined the Laboratory on the 1st May 1935.

As in the past, two students from outside, viz, Messrs P H Bhutta and V S Matkar were selected for training at the Laboratory from 1st December 1934 for a period of six months. Their period of training expired on the 31st May 1935

During the period under review, the writer was elected a Fellow of the Institute of Physics, London, and a Fellow of the Indian Academy of Sciences Bangalore. He was also nominated by the Government of Bombay as a member of the Board of the Victoria Jubilee Technical Institute, Matunga, and a Fellow of the University of Bombay

Mr D L Sen, Senior Research Assistant, was sanctioned by the Committee one year's study leave outside India and he left India on the 20th September 1935 to join the College of Technology, Manchester

The temporary post of Personal Assistant was extended for a further period of one year and Mr V Venkataraman continued to hold that post in addition to his own duties

Mr H B Joshi continued to be in charge of the Yarn Testing Section

The Indian Central Cotton Committee at its meeting held on the 4th February 1935 while reviewing the work of the Laboratory desired that a brochure containing an account of the past work of the Laboratory be written up by the undersigned together with a programme of work for the future. The brochure and the programme were considered by the Committee at its

meeting held on the 20th August 1935 and it was decided that the brochure should be published for the information of the public

As in the past the Laboratory has continued to attract a large number of visitors These included prominent men, people connected with the textile trade and industry, students of agricultural, commerce and technical colleges, etc It may also be stated here that the Laboratory possesses a small but well equipped Library of its own The Library contributes to most of the leading journals devoted to textile research and every effort is made to keep it up to date

Equipment—During the period under review, the following machines and apparatus were added to the equipment of the Laboratory —

Machines —

- (1) Horizontal opener cleaner
- (2) Cage Exhaust
- (3) New Hopper Feeder with three step cone pulleys
- (4) Improved dust trunks with vibrating grids
- (5) Two cyclones

All the machines were supplied by Messrs Tweedales and Smalley (1920) Ltd, Castleton, Rochdale In addition, the old hopper feeder has been provided with strong upright and evener lattices and the old Crighton opener with new triangular grid bars and new sets of blades The scutcher has now been equipped with a variable speed motor in which the beater speed can be varied from 500 to 1000 r p m Another important feature of the present blow room is the provision of a bye pass by means of which the Crighton opener can be thrown out in the case of clean cottons for which a milder blow room treatment is regarded sufficient

- (6) Two new Electric motors one of $8\frac{1}{2}$ H P and the other of 13 H P supplied by the Asea Electric Limited, Bombay
- (7) One Brunswiga Calculating Machine

Apparatus —

- (1) Single Yarn Twist Tester manufactured by the Fine Cotton Spinners' and Doublers' Association, Rock Bank, Bollington, Cheshire
- (2) One Strength Tester with graphic recorder manufactured by Louis Schopper, Leipzig, Germany, for artificial silk work
- (3) One Electric Oven by Messrs Baird and Tatlock (London) Limited

ACKNOWLEDGMENTS

In presenting this report I wish to express my gratefulness to the office-bearers of the Indian Central Cotton Committee for the deep and sympathetic interest they have uniformly taken in the work of the Laboratory, to the East India Cotton Association to Major Ellis Jones and Messrs C P Bramble and Varjivandas Motilal for the supply and valuation of samples and to the entire staff of the Laboratory for their loyal co-operation which made the work possible

NAZIR AHMAD,

Director,

Technological Laboratory

Dated the 9th November 1935

CHAPTER VII.

REPORT OF THE PUBLICITY AND PROPAGANDA OFFICER FOR THE YEAR ENDING 31ST AUGUST 1935.

INTRODUCTION

THE past year was one of sustained progress for the Propaganda and Publicity Department. The vital contact that the Department maintains between the activities of the Indian Central Cotton Committee on the one hand and the needs and interests of the cultivator, general public and government departments on the other was widened and deepened. The Department's activities were not exhausted by the publication and broadcasting of information. Important as this side of its activities was, the more vital purpose was to act as a sensory nerve keeping in live touch with the increasing requirements of the cotton world, and assisting the Committee to direct its work along the most fruitful channels.

Cotton interests not only in India but those outside drew upon the resources of the Department and the contact established during the last few years between the Committee and organisations in England and Japan continued unbroken. Through this Department the efforts of the Lancashire Indian Cotton Committee to increase the off take of Indian cotton and thereby to promote the cotton trade between the two countries obtained wide publicity throughout India.

PINK BOLL WORM CONTROL EXTENSION CAMPAIGN IN THE UNITED PROVINCES

The most notable event during the period under report was the province-wide campaign conducted by the Publicity Officer for the extension of control measures of the pink boll worm, a pest of cotton which in one year caused a loss of nearly 2½ crores of rupees to the crop in the United Provinces, and the enquiry connected therewith for the purpose of finding out what amount of cess should be levied to meet the cost of heating machines, their installation and working expenses, etc. The campaign extending over three months from the beginning of the year was preceded by two brief visits of a fortnight's duration each time paid to the experimental area with a view to study the effect of sun heating of the village stocks of cotton seed (*binaula*) in the areas then under pink boll-worm control in the districts of Aligarh, Saharanpur and Bijnor and later on to see the results of the heating process at the commencement of the harvest. The decided superiority of the crops in the treated area over the adjacent uncontrolled area both in regard to the stand of the plant, the opening of the bolls and the quality and quantity of the lint produced, by comparing the yield per acre,

and the price realised convinced me of the efficacy of the method of sun heating the seed for completely destroying the pest which had resulted in a considerable improvement of the crop to the thorough satisfaction of the grower and of the vital necessity of extending the control measures

DEMONSTRATION AT THE COUNCIL HALL LUCKNOW

A noteworthy feature of the campaign was the staging of a special demonstration illustrative of samples of cotton which were supported and explained by printed labels charts and graphs relating to the scheme in the Council Hall of the Legislative Council of the United Provinces. Considerable impetus to the focussing of attention of the members on the importance of adopting the scheme of Pink Boll Worm Control Extension was imparted by the organisation of demonstration on the 11th and 12th and again on the 20th of March at a time when the session was in progress. The members were taken round the exhibits whereafter there was a conference. The Pink Boll Worm posters in English Hindi and Urdu attracted much attention. Questions relating to the loss caused by the pest and the striking gain that had resulted in the quality and quantity of *kapas* of the areas where control methods had been applied were freely asked and answered.

In taking stock of the extensive and thorough propaganda campaign in the United Provinces which closed in the middle of April the following observations and accomplishments may be of interest —

- (1) Local interests all over the province were notified of my visit and a well planned propaganda campaign commencing several weeks in advance of my visit to the station was found most effective. A circular letter stating the object of the campaign and the purpose of the enquiry connected therewith was mailed to all notable persons from the Entomologist's office at Cawnpore. This made the task of organising province wide meetings and/or obtain personal interviews with the co-operation of the civil authorities more thorough. Nothing was left to chance as regards eliciting the views of those I met. Hundreds of meetings and conferences were held in townships and villages.
- (2) In advance of and during the campaign there were sent out numerous circulars of informations giving facts regarding improvements carried out as the result of sun heating the seed and other information necessary. A Pink Boll Worm Bulletin giving the main features of the scheme of extension was written incorporating control measures.
- (3) A ten colour poster to further the campaign was likewise prepared. About 5 400 leaflets and 1 400 posters were issued to growers merchants ginnerers and other men of influence.

- (4) The campaign brought together men from all interests concerned with cotton industry and others indirectly allied with it with one object in mind and that is to protect the crop from the ravages of the pest and avoid the colossal preventible loss caused by it

Excellent co-operation was extended to the Publicity Officer by all interests concerned—the Department of Agriculture United Provinces *Zamindars* businessmen ginners and other allied interests Newspaper publicity was carefully handled in order to prevent undue alarm in those districts of the province where propaganda in favour of the scheme had not been carried out At the same time sufficient information was disseminated in the affected areas to focus attention and secure action from farmers whose crops were menaced and their representatives in the Legislative Council.

This vigorous Pink Boll Worm Extension Campaign has I think remarkably succeeded in bringing to the attention of the interests concerned and the public the real necessity of tackling the problem and the benefits which will accrue to the cotton crop of the United Provinces by so doing

A 46-page report of the tour and enquiry in the United Provinces has been submitted to the Government of the United Provinces Copies were placed on the table for members information during the last half yearly meeting of the Indian Central Cotton Committee

PRESS COMMUNIQUÉS

During the year under report the Publicity Officer issued the following press communiqués —

- (1) *The Reports of the 29th and 30th meetings of the Indian Central Cotton Committee*
- (2) *Development of Cotton Growing in Sind*
- (3) *Development of Cambodia Cotton in Coimbatore District*
- (4) *Development of Cotton Cultivation in Central Provinces*

A press note was issued on *Facilities for training at the Textile Laboratory Matunga* to bring to the notice of Laboratory would admit this year two students of spinning and the routine methods of testing cotton fibre and yarn

- (5) *Combing of Good Quality Indian Cotton*
- (6) *Effect of Storage prior to Ginning on the Spinning Quality of Cotton*
- (7) *Development of Cotton Growing in the Bombay Presidency*

SPECIAL ARTICLES

The Publicity and Propaganda Officer has been sending out special articles to the press. These articles are in a language easily understood by the layman and contain much timely information. Through them the wider public is kept constantly in touch. The following articles based on literature already available were contributed and published —

- (1) *Problems of Cotton Growing in the Central Provinces and Berar* — (Published in *Hindustan*, Nagpur, and the *Civil & Military Gazette*, Lahore)
- (2) *Improving the Indian Cottons* — (Published in *Textile Weekly*, Manchester)
- (3) *Improvement of Broach Cotton* — (Published in *Textile Mercury & Argus*, Manchester)
- (4) *Survey of Commercial Indian Cottons* — (Published in *Current Science*, Bangalore)
- (5) *Yarn Testing and Its Importance to Cotton Mills* — (Published in *Indian Textile Journal*, Bombay)
- (6) *High Draft Systems of Spinning and Their Importance to Trade* — (Published in *Indian Textile Journal*, Bombay)
- (7) *Cotton—India's Greatest National Industry* — (Published in *Indian Textile Journal*, Bombay)
- (8) *Promotion Activities with Respect to India's Cotton Production this Year and thereafter* — (Published in *Cotton Trade Journal*, America)

The last article formed a special feature of the Annual International Edition of the *Cotton Trade Journal*, America. This is creditable inasmuch as the journal is the foremost cotton journal in the world.

PAMPHLETS

The Publicity and Propaganda Department continued to regard as its prime function the dissemination of the results of scientific cotton research through the medium of publications and distribution of publicity literature—pamphlets, leaflets, handbills and articles to the press. During the period under report the following pamphlets and leaflets were issued —

- (1) *Pink Boll Worm Pest of Cotton and How to Control It* — This is an illustrated, five-page leaflet prepared for the pink boll

the injury to the cotton
in the north, *Pectinophora gossypiella*
the cotton

2. *Annual Meeting of the*

The *First Year Cotton and How to*
the two vernaculars, Hindi
in the United Provinces. They
the *Red-Worm Control Campaign*

1. *Cotton* *India* *Right Bank Area* — Promotion of
the *Indian-American cotton (4F 18)*
the *Indus under perennial*
the *Ratnara Canals* has been going
The *Publicity and Propaganda*
the *Central Cotton Committee* had a large
the *propaganda effort* by suggesting
the *propaganda* and by supplying
the *end in view*
the *out* has rendered considerable

1. the *Progress Report* for the year
the *Extension Scheme* says
the *English* designed and
the *Indian Central Cotton*
the *tract* A
the *Right Bank Area*
the *Indian Central Cotton*
the *Agricultural Officer* in
the *therefore*
the *good*
the *from*
the

with cart loads of 2500—one stained and the other of good quality, undamaged by the pink boll worm. There are two buyers also in the conversation between the one cultivator and the buyer and the other paid draws attention to the urgency of heating the cotton seed in a furnace oven as an example.

Hindi and Urdu versions of the poster have also been prepared. Photographs of the poster on 'The Pink Boll Worm Pest of Cotton' prepared for the campaign in the United Provinces were also sent to the press in India and abroad.

A Telugu version of the poster 'India's Bid for Supremacy in World's Cotton Markets' was printed for use in the Madras Presidency. The poster deals with the export figures of cotton and emphasises the national and international importance of this commodity.

EXHIBITIONS

The Department participated in

- (1) The *Exhibitions at Nand I* organised by the Agricultural Department, Hyderabad State, on 30th November and 1st December 1944.
- (2) The *Kothipuri Fair* which was held in the 2nd week of May 1945.
- (3) The *All India Exhibition* which commenced on the 16th of December 1944 in Lahore.
- (4) The Agent, Japan Cotton Spinners' Association, Bombay, asked for photographs and models showing the various activities of cotton agriculture in India as also the activities of the Indian Central Cotton Committee's Technological Laboratory at Matunga. He further requested for pamphlets for the dissemination of scientific information bearing on problems which the Committee was tackling and posters for use at the *Memorial Exhibition at Tokyo (Japan)*. In addition to the supply of publications and posters he was provided with a number of large scale photos on the different sections of the Technological Laboratory.

HEAVY DEMAND ON PUBLICITY LITERATURE

There is a constant demand and although supplies are some leaflets and other publications. In addition to the heavy demand on publicity literature from an ever increasing number of people, we also received from abroad Mr. A. K. requested a supply of all illustrated publications. India to help him in preparing literature.

slides for a series of lectures he was going to deliver. The Chief, Periodical Division, U S Department of Agriculture Library, Washington, requested for press communiqués for 1933-34 and other publications of the Department.

APPRECIATIVE REFERENCE TO THE COMMITTEE'S PUBLICITY WORK

"The Indian Central Cotton Committee maintains its excellent work", comments the British Cotton Growing Association in their 13th Annual Report (1934), "and several matters of great importance to the industry in India have engaged its attention during the past year. The various reports issued by its Publicity Officer have contained information of much interest and have done good propaganda work in disseminating scientific and practical information relating to the improvement of cotton in India . . . etc."

R D MIHRA,
Publicity & Propaganda Officer

APPENDIX I.

MEMBERS OF THE COMMITTEE

(1) PRESIDENT.—

Dewan Bahadur Sir T. Vijayaraghavacharya, K B E., Vice-Chairman, Imperial Council of Agricultural Research, *ex-officio*

(a) The Expert Adviser to the Imperial Council of Agricultural Research in Agricultural matters, *ex-officio*

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS —

Madras MR. Rao Bahadur D. Ananda Rao Garu, I A S

Bombay The Director of Agriculture

United Provinces Mr. R. G. Allan, I A S, Director of Agriculture

Punjab .. Mr. H. R. Stewart, I A S, Director of Agriculture

Central Provinces , Mr. J. H. Ritchie, I A S, Director of Agriculture

Burma .. Mr. F. D. Odell, I A S, Deputy Director of Agriculture, West Central Circle, Magwe

(3) THE DIRECTOR-GENERAL OF COMMERCIAL INTELLIGENCE AND STATISTICS, *ex-officio*

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS —

The East India Cotton Association . Sir Purshotamdas Thakurdas Kt, C I E., M B E., (*Vice-President*)

The Bombay Millowners' Association .. Mr. S. D. Saklatvala, M L C

The Bombay Chamber of Commerce Mr. A. A. Sarantides

The Indian Merchants' Chamber Mr. Chunilal B. Mehta

The Karachi Chamber of Commerce .. Mr. G. C. R. Coleridge

The Ahmedabad Millowners' Association . Seth Sakarlal Balabhai, M L C

The Tuticorin Chamber of Commerce .. Mr. J. Vonesch

The Upper India Chamber of Commerce Mr. J. Tinker

The Empire Cotton Growing Corporation Mr. W. Roberts, C I E

(5) and (6) COMMERCIAL REPRESENTATIVES NOMINATED BY LOCAL GOVERNMENTS —

Central Provinces { Mr. Y. G. Deshpande
Rao Bahadur G. R. Kothare, M L C

Madras Mr. J. Nuttall

Punjab Khan Bahadur Sardar Habibullah, M L C

Bengal Mr. Akhil Bandhu Guha

(7) CO-OPERATIVE BANKING REPRESENTATIVE —

Rao Bahadur M. G. Deshpande, C B E.

(8) REPRESENTATIVES OF COTTON-GROWING INDUSTRY —

<i>Madras</i>	{ Mr K. S. Ramaswami Gownder M.R.Ry. Rao Bahadur B. P. Sesha Reddy Gam, M.L.C.
<i>Bombay</i>	{ Sardar Rao Bahadur Bhimbhai Ranchodji Nask, M.L.C. Rao Bahadur C. S. Shurahattu.
<i>United Provinces</i>	{ Khan Bahadur Shah Nazar Husain M.L.C. Rai Bahadur Lala Anand Sarup M.L.C.
<i>Punjab</i>	{ Sardar Sampuran Singh, M.L.C. Mian Nurullah, M.L.C.
<i>Central Provinces and Berar</i>	{ Mr N. M. Deshmukh. Mr J. B. Deshmukh

(9) and (10) REPRESENTATIVES OF INDIAN STATES —

<i>Hyderabad State</i>	Mr Nizam ud Din Hyder Director of Agriculture.
<i>Baroda State</i>	Mr C. V. Sane Director of Agriculture.
<i>Gwalior State</i>	Mr H. H. Pandya Director of Agriculture
<i>Rajputana and Central India States</i>	Mr F. K. Jackson Director Institute of Plant Industry Indore

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR-GENERAL IN-COUNCIL—

- 1 Mr D. N. Mahta Economic Botanist for Cotton Central Provinces
- 2 Rao Bahadur S. S. Salmath Deputy Director of Agriculture Southern Division Dharwar
- 3 Dr V. K. Badami I. H. D. Deputy Director Department of Agriculture in Mysore State Bangalore
- 4 M. R. Ry. V. Rananatha Ayyar A. I. Cotton Specialist Coimbatore.
- 5 Musahbilhas Balalur S. V. Janungo Finance Minister Holkar State Representative of the Holkar State
- 6 Mr K. I. Thadani Botanist in Sindh Agricultural Research Station Sakrand
- 7 Seth Isserdas Varindmal Representative of the Karachi Indian Merchants Association
- 8 Mr P. B. Richards I. A. S. Entomologist to Government United Provinces.
- 9 Khan Bahadur Nawab Fazlul Khan Chairman District Board and President Central Co-operative Bank Ltd. Gujrat (Punjab)
- 10 Khan Sahib Farrukhbeg Sadkalibeg Mirza Nawabshah Sind
- 11 Lala Shri Ram Representative of the Cotton Millowners of Delhi
- 12 Mr Chellaram Shewaram Representative of the Karachi Cotton Association Ltd

APPENDIX II.

CONSTITUTION OF SUB-COMMITTEES

STANDING FINANCE SUB-COMMITTEE

Dewan Bahadur Sir T Vijayaraghava charya (<i>Ex-officio</i>)	Mr J Vonesch
Sir Purshotamdas Thakurdas (<i>Chairman</i>)	Mr Chunilal B Mehta
Mr S D Saklatvala.	Mr G C. R Coleridge
Sardar Rao Bahadur Bhimbhai Ranchodji Naik.	Rao Bahadur G R Kothare
	Mr A A Sarantides

LOCAL SUB-COMMITTEE.

Dewan Bahadur Sir T Vijayaraghava charya	Mr J Vonesch
Sir Purshotamdas Thakurdas	Mr Chunilal B Mehta
Mr S D Saklatvala	Mr G C R Coleridge
Sardar Rao Bahadur Bhimbhai Ranchodji Naik	Rao Bahadur G R Kothare
	Mr A A Sarantides

COTTON GINNING AND PRESSING FACTORIES SUB COMMITTEE

Sir Purshotamdas Thakurdas	Mr G C R Coleridge
Mr S D Saklatvala	Mr J Nuttall
Mr J Vonesch	Mr W Roberts
Mr Chunilal B Mehta	Mr Y G Deshpande
	Vacant (two places)

The Co operative Representative—Rao Bahadur M G Deshpande and
Mr Chellaram Shewaram—(*Co opted Member*)

AGRICULTURAL RESEARCH SUB COMMITTEE

- I *The President*—Dewan Bahadur Sir T Vijayaraghavacharya (*Ex-officio*)
- II *The Vice President*—(*Ex officio*)
- III *The Director Institute of Plant Industry*—Mr F K Jackson (*Ex-officio*)
- IV *The Co-operative Representative*—Rao Bahadur M G Deshpande (*Ex-officio*)
- V *Cotton Growers Representative*—Mr W Roberts

- VI *Cotton Trade Representative*—Rao Bahadur G R Kothare (Co-opted for the August 1935 meeting)
- VII *Four Agricultural Officers*—Mr B S Patel Mr J H Ritchie Mr H R Stewart Mr V Ramanatha Ayyar
- VIII *Additional Members*—Mr B C Burt Mr R G Allan Mr K I Thadani (Co-opted for the August 1935 meeting) Rao Bahadur D Ananda Rao Garu (Co-opted for the August 1935 meeting) Mr D N Mahta Mr P B Richards Mr C V Sane Mr Chunilal B Mehta Mr Nizam ud Din Hyder Mr H H Pandya
- IX *Co-opted Members*—Mr Mohammad Afzal Rai Sabeel Kaldas Sawhney Mr J B Hutchinson
- and
- X *The Secretary*

TECHNOLOGICAL RESEARCH SUB COMMITTEE

The President (<i>Ex officio</i>)	Mr Chunilal B Mehta
Sir Purshotamdas Thakurdas	Seth Sakarlal Balabhai
Mr B C Burt	Mr J Tinker
Mr B S Patel	Mr A A Sarantides
Mr H R Stewart	Mr Y G Deshpande
Rao Bahadur D Ananda Rao Garu	Lala Shri Ram
Mr S D Saklatvala	Dr Nazir Ahmad
Mr A D Walwyn Mr Dharamsi Mulraj Khatau (Representing the Bombay Mill owners Association)	
Mr Kasturbhai Lalbhai Seth Chamanlal G Parekh (Representing the Ahmedabad Millowners Association)	
Mr R G Saraya Mr Jamnadas Ramdas (Representing the East India Cotton Association Ltd)	
Seth Isserdas Varindmal (Representing the Karachi Cotton Association Ltd)	

RESEARCH STUDENTS SELECTION SUB COMMITTEE

The President	Mr F K Jackson
The Vice-President	Mr C V Sane
Mr B C Burt	Mr H H Pandya
Mr B S Patel	Mr Nizam ud Din Hyder
Mr H R Stewart	Dr Nazir Ahmad
Mr J H Ritchie	The Mysore Representative (Dr V K Badami) and
Mr R G Allan	Vacant (two places)
Mr P B Richards	

SUB COMMITTEE ON MALPRACTICES

Sur Purshotamdas Thakurdas.	Sardar Sampuran Singh
Mr B S. Patel	Seth Sakarlal Balabhai
Mr G C. R. Colledge	Seth Isserdas Varandmal
Mr Chunilal B Mehta.	Vacant.

COTTON FORECAST IMPROVEMENT SUB-COMMITTEE

The President.

The Director-General of Commercial Intelligence and Statistics Calcutta

The Director of Agriculture Bombay Presidency

Do do Punjab

Do do Madras

Do do United Provinces

The Chief Agricultural Officer in Sind

The Director of Land Records Central Provinces and Berar

The Director of Agriculture Baroda State

The Director of Statistics H E H the Nizam's Government

The Deputy Director of Statistics Calcutta

SPECIAL SUB COMMITTEE ON WIDER MARKETS FOR INDIAN COTTON

The President	Mr R G Allan
The Vice-President	Khan Bahadur Sardar Habibullah
Mr B C Burt	Sardar Rao Bahadur Bhimbhai Ranchodji Naik
Mr H R. Stewart	Rao Bahadur D Ananda Rao Garu (Co-opted for the August 1935 meeting)
Mr J H Ritchie	Mr Nizam ud Din Hyder
Mr B S Patel	Mr V A Tamhane (Co-opted for the August 1935 meeting)
Mr S D Saklatvala	Mr Kasturbhai Lalbhai Mr R. G Saraiya (Co-opted)
Mr J Vonesch.	
Mr Chunilal B Mehta	
Mr Y G Deshpande	

STANDARDS SUB-COMMITTEE

- Dr Nazir Ahmad (Representing the Imperial Council of Agricultural Research)
- Mr Haridas Madhavdas Mr Varjivandas Motilal (Representing the East India Cotton Association, Ltd)
- Mr M Napier, Mr Nechaldas Chhangomal, (Representing the Karachi Cotton Association, Ltd)
- Mr N M Deshmukh, Rao Bahadur G R Kothare, (Representatives of cotton growers of Berar Tract)
- Mr Himatlal Jagjiwandas Vadodaria, Mr Vadilal Chunilal Doshi, (Representatives of cotton growers of Mathia Tract)
- Mr Akhubava Takatsinghji Chudasama, Rao Saheb Kevalbhai Desai (Representatives of cotton growers of Dhollera Tract)
- Mr Hanubhai Jhaveribhai Amin Mr Ardeskar Jamshedji Kapadia (Representatives of cotton growers of Broach Tract)
- Sardar C B Naik Bahadur Desai Rao Bahadur B L Patil, (Representatives of cotton growers of Kumpta Tract)
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APPENDIX III.

LIST OF RESOLUTIONS.

"That the International Federation of Master Cotton Spinners' and Manufacturers Associations be informed that the rule on the representation of the East India cases of hardships and losses incurred rejected in arbitration for faults in marking of markings as follows:-

"The Indian Central Cotton Committee recommends that a minimum balance should be maintained, and that it be Rs. 9 lakhs. There should be no objection, however, to draw upon this minimum balance in case of emergency, provided such shortages are made good as soon as conditions improve."

"The Indian Central Cotton Committee recommends that the Government of India should maintain a minimum balance of Rs. 9 lakhs for the purpose of the Cotton Marketing Scheme."

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provide

"The Indian Central Cotton Committee requests the Government of India to take immediate steps to amend the Cotton Ginning and Pressing Factories Act No. 12 of 1926 so as to protect the interests of the cotton growers in all respects."

"The Indian Central Cotton Committee wishes to place on record its sense of appreciation of the services rendered by Major W. Ellis Jones, extending over a period of ten years, in connection with the grading and valuing of cotton samples received for tests at the Technological Laboratory, and regrets that circumstances now compel him to relinquish this work."

"The Indian Central Cotton Committee wishes to place on record its sense of appreciation of the services rendered by Major W. Ellis Jones, extending over a period of ten years, in connection with the grading and valuing of cotton samples received for tests at the Technological Laboratory, and regrets that circumstances now compel him to relinquish this work."

"With a view to the improvement of the cotton marketing system, the Indian Central Cotton Committee recommends that the Government of India should maintain a minimum balance of Rs. 9 lakhs for the purpose of the Cotton Marketing Scheme."

organised marketing

"The Indian Central Cotton Committee now to these rooms

"That in view of the fact that the scheme of work on spotted boll worm control terminates in June 1936, the Central Cotton Committee desires to emphasise the necessity of legislative sanction being obtained before that date to enable the uprooting of cotton stalks to be enforced"

"The Indian Central Cotton Committee Government to

"The Indian Central Cotton Committee regrets that the Government of India have not yet passed any orders on the unanimous Resolution of the Committee recommending to the Government of India to resume the broadcasting of cotton rates and hopes that the practice of broadcasting cotton rates will be resumed as soon as possible"

"The Indian Central Cotton Committee welcomes the Bombay the Bombay Government pro
Committee is convinced that
cotton will spread rapidly in
F cotton to the detriment of

"The Indian Central Cotton Committee Committee at which Sir T
efficient manner in which Sir
for six years His consistent
patience in dealing with the
have been an asset to the Committee

"The Committee records its best thanks to Sir T. Vijayaraghavacharya for the continued close attention he gave to details of the questions disposed of during this period and it tenders him its best wishes on the eve of his retirement"

2 *Contributing Members of the Institute*—During the year the State of Jhabua in Central India and the Thukanas of Khetri in Jaipur and Bagh in Gwalior became members. One State, Jhalawar, has temporarily withdrawn from membership for financial reasons.

At the closing date of this report the following twenty-three States and Thikanas were members of the Institute, arranged in order of joining —

Indore	Tonk	Orchha
Dhar	Bijawar	Bharatpur.
Jaora	Barwani	Jodhpur
Datia	Bikaner	Alwar
Rutlam	Rewa	Khetri
Dewas (Senior Branch)	Jaipur	Bagli
Sitamau	Bundi	Jhabua
Narsingarh	Partabgarh	

The financial situation having become somewhat easier in most States and the Institute's reputation having grown, it is satisfactory to record rather numerous enquiries from States which are not yet members

On the other hand the Indian Central Cotton Committee, faced with the exhaustion of its accumulated reserves, has found itself unable to continue to sanction annual grants of Rs 1,15,000 and the Institute's annual income from this source will now be reduced by Rs 15 000. This serious situation can only be met by further contributions from States or by the dismissal of personnel which will reduce the output of research work

3 *Staff and Students* —The Director was absent on leave from March 10th, 1934, to October 18th, 1934, and the Geneticist and Botanist officiated during that period

The post of Senior Botanical Assistant was filled after advertising it, by the promotion of Mr R L M Ghose, M Sc, who had been Botanical Assistant for some years

For lack of funds a number of sanctioned posts cannot be filled.

Mr G G Phadke, L Ag, Junior Farm Assistant, remained on deputation as Agricultural Officer to Bharatpur State

It is a pleasure to record the keenness and enthusiasm of personnel in all Sections

4 *Visitors* —On the 28th July, 1934 the Institute was honoured by the visit of Their Excellencies Sir George and Lady Beatrix Stanley Viceroy and Vicereine who spent an hour examining in detail some of the more important of the Institute's achievements and the work in progress

Among other visitors were the following —

Amar Singh, Kunwar of Jasol, Director of Agriculture and Grass Farms, Jodhpur State

Anderson, Jane (Miss), Mission Hospital Indore

Ardesur, Major, D K, M R C S, Mhow, C I

Armstrong Dr Allan E., Secretary, United Church of Canada Mission, Toronto, Canada.

Augier, D E. O B E., Joint Opium Officer Malwa States and Assistant Opium Agent, Neemuch, C I

Dasu S., Meteorologist, Poona

Ben, Mira (Miss), Wardha.

Bhandari, K L., Rai Bahadur, Managing Director, Nandlal Bhandari Mills Indore

- Bree P G I.C.S. Excise and Opium Commissioner in Central India and Adviser on Opium Affairs in Rajputana Indore
- Burnett Major R R C of Adviser Tonk State Rajputana
- Caswell K (Miss) Mission Girls High School Indore
- Chatterjee Rev J C Superintendent of Education Delhi Ajmer Merwara and Central India.
- Crofton R. M I.C.S. Excise and Opium Commissioner in Central India and Adviser on Opium Affairs in Rajputana Indore
- Davies P Consulting Engineer Holkar State
- Desai Mahadev Maganwadi Wardha
- Devisingh Thakur Lt-Col Rai Bahadur Singha Member Jampur
- Dhanda Captain H C Deputy Commissioner Commerce and Industry Holkar State Indore
- Dodds J L. (Mr and Mrs) American Presbyterian Mission Dehra Dun U P
- Fatehuddin Chowdhri Khan Bahadur Offg Director of Agriculture Punjab Lahore
- Foster A R Imperial Chemical Industries (India) Ltd Calcutta
- Gandhi M K Wardha.
- Ghosh Hanjban M A Professor and Head of the Department of English Holkar College Indore
- Gulamab Huzur Secretary to His Highness the Nawab of Jaora C I
- Hardy M F D Sc Private Secretary to His Highness the Maharaja Holkar
- Hill, M (Miss) Toronto Canada
- Hilliard D (Miss) Mission Hospital Indore
- Holkar Malbar Rao Sardar Ada Bazar Indore
- Holkar Her Highness the Maharani Indore
- Hutchinson E (Miss) Pemba Zanzibar
- Kale Dinkarrao Sardar Dewas (Senior)
- Kanungo Musahib-i-Khas Bahadur S V M A Finance Minister Holkar State Indore
- Karmarkar D V M Sc Ph D A I S C Cold Storage Research Scheme Poona
- Khan Sarfaraz Ali Khan Bahadur Chief Secretary Jaora C I
- Khasgiwala Fatehlal Agricultural and Treasury Officer Partabgarh (Rajputana)
- Kirpalani Capt J K I M S (Retired) Indore
- Kothare Rao Bahadur G R M L C Member Indian Central Cotton Committee Khamgaon Berar
- Lalbhai Seth Kasturbhai Ahmedabad
- Langar Pandit M M Diwan Jhalawar State Rajputana
- Macnabb Lieut Colonel R J I A Agent to the Governor General in Central India Indore

- Mahendra Singh, Thakur, Revenue Member, State Council, Bundi (Rajputana)
- Masib, Kenneth B V, Christian College, Indore
- Mehta, Chunilal B, Member, Indian Central Cotton Committee Bombay.
- Mukerjee, R K, Professor and Head of the Department of Economics and Sociology, University of Lucknow, U P
- Mukerjee, W, Allahabad Agricultural Institute, Naini
- Myers, A J W, Hartford, Connecticut (U S A)
- Nadhkar, Dewan Bahadur K, Dewan and President, State Council, Dhar, C I
- Naik, Bhumbhai, Sardar Rao Bahadur R, M L C, Member, Indian Central Cotton Committee, Surat
- Narsingarh, His Highness the Maharaja of
- Natu, R. S., B S E, Divisional Engineer, Yeshwant Sagar Works, Indore
- Orchha His Highness the Maharaja of
- Parekh, Manilal, Rajkot Kathiawar
- Patterson G (Miss), United Church of Canada Mission, Kharua, C I
- Patwardhan, K A, M Sc, Master, Daly College, Indore
- Pearce F G, Principal, The Scindia School, Gwalior
- Pearson D (Miss), Mission Girls' High School, Indore
- Prabhunath Singh, Maharaj Narsingarh, C I
- Prayag Rao Sahib C H, Cotton Breeder, Jalgaon
- Rajkumar Singh, Managing Director, Rajkumar Mills Indore C I
- Rama Reddi, P H, M A, B Sc, I A S, Secretary Indian Central Cotton Committee, Bombay
- Ram Prasad Singh Rai Sahib, Thakur, Economic Botanist United Provinces Government Cawnpore
- Reemich, E de C (Miss), Companion to Her Highness the Maharani, Rewa, C I
- Reshumwale Gopal Rao Sardar, Indore
- Roberts Sir James R, Special Member, Council of State, Dewas (Senior) C I
- Roberts, Lady, Dewas (Senior) C I
- Sardar Kurgain H A, M A, I E S (Retired) Late Inspector of Schools, Nerbudda Circle, C I and Southern Division, Bombay
- Sajjan Singh, Narsingarh, C I.
- Sangli, M G, Jodhpur (Rajputana)
- Sangli, S G, C/o Sangli Bros, Indore, C I
- Scott, Rev A A, Principal Christian College, Indore
- Schneider, B H, Dr (with a party of 25 students), Allahabad Agricultural Institute, Naini.

Short, H. C., Commissioner in India, Lancashire Indian Cotton Committee

Sully, T. D., Principal, St. John's College, Agra.

Talcherkar, V. A., late Textile Expert to the Holkar Government, Indore

Taore, K. A., Dr., Dewas (Senior), C. I.

Taylor, Rev. J. T., United Church of Canada Mission, Indore.

Taylor, Rev. H. E., United Church of Canada Mission, Indore

Thakurdas, Sir Purnabotamdas, Kt., C.I.E., M.B.E., Vice-President, Indian Central Cotton Committee, Bombay

Trench, C. G., Chenevix, C.I.E., I.C.S. (Retired), Revenue Commissioner, Udaipur, Mewar.

Vijayaraghavacharya, Dewan Bahadur Sir T., K.B.E., Vice-Chairman, Imperial Council of Agricultural Research, Delhi, President, Indian Central Cotton Committee

Wither, C. (Miss), Mission Hospital, Indore

Zahm Singh, Sardar, Kamausdar, Dewas (Senior), C. I.

Zutshi, Dewan Bahadur B. N., Vice-President, State Council, Rewa, C. I.

5 Library.—Accessions during the year were thus :—

Text-books and works of reference	71
Volumes of Journals	193
Reports, Bulletins, etc	546
Total accessions	<u>810</u>

Six new journals have been added to the list of periodicals taken by the Library. Loans of 182 books and journals were made to cotton research workers and others and to libraries in India and abroad. No less than 1,690 has been tem, the ie for the

RESEARCH WORK

6 Organisation.—There is little new to record under this heading, the extra facilities provided mentioned in the last report have been fully utilised with increased output of work and efficiency. A still larger number of field trials have been handed over to the Farm Section for execution so freeing research staff for other work.

The methods referred to in the 1934 report of central control of field experiments in out-stations have proved themselves and have been expanded, by their aid a very large mass of information of known accuracy has been acquired.

Once again the cordial co-operation of the States' Darbars and their officers as well as no small number of voluntary workers, must be acknowledged. With this aid much more rapid progress is made possible.

Similar acknowledgment is also due to the Provincial Departments of Agriculture, notably those of Bombay, the United Provinces, the Central Provinces, the Punjab and Madras for much assistance and co-operation willingly rendered, also to Agricultural

Departments in the United States of America, Australia, South Africa and other parts of the Empire and to officers of the Empire Cotton Growing Corporation

7 *Weather and its effect on crops*—In Malwa, following a *rabi* season of low rainfall the 1934 monsoon was exceptional. The yearly *kharif* crops on the *khajur* and *amroli* varieties of soil throughout the whole of the *Malwa* also did

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the *khajur* and *amroli* varieties was cut to the ground and abandoned. Severe hailstorms harmed *rabi* crops in East Central India

8 Cotton—Botany and Genetics

(a) Botanical Survey of cottons in Malwa and Nimar.

A draft paper on the *botanical classification of cotton* with special reference to Asiatic species has been written and awaits the verification of a few small points at the Herbarium, Royal Botanical Gardens, Kew. This paper deals with botanical principles only.

The analysis of the survey of *Malwa and Nimari cottons* is at present being written up. It is hoped in this paper to indicate the possibilities and limitations of an agricultural classification.

Useful information has been obtained and valuable types have been selected from a collection of Burma and Assam types obtained through the good offices of the Hon'ble the Agent to the Governor-General in Central India.

(b) *Genetics*—The study of X-rayed material yielded negative results. Some indications of cytological abnormality were noted but on further investigation they proved to be of small importance. This line of work has been suspended in favour of lines of more immediate value.

Work on the inheritance of major factors

Work on the inheritance of quantitative characters has now become the main part of the genetics programme. The results obtained by the improved technique (see below under statistics) developed in the season under review have been very encouraging indeed.

A number of new selections from Malwa will be tested in replicated progeny rows this season, and desirable progenies will be carried on and tested against the existing strains.

Selection work on Malwa Upland cotton has been transferred to Badnawar (Dhar State) in the best Upland cotton growing district in Malwa.

At Dhar, progeny row selection has been initiated in a mass selected Malvi cotton maintained by the Agricultural Department, and in the Nimar tract of Dhar State selection in the local Nimari bulk has given an immediate improvement of considerable magnitude.

Thanks to the co-operation of the Agricultural Department, Dhar State, it has been possible to carry out the breeding work in all three of these centres by the replicated progeny row technique developed at the Institute.

Work on the selection of the best cotton for the Dhar State Progeny Rows. H.V.

(f) *Variety Trials*—A large number of variety trials were carried out in the period under review. The potentialities of existing selected varieties for the different tracts of Central India and Rajputana are now fairly well known, and may be summarised as follows:

(1) Black soil tracts of Central India (Malwa plateau)

(a) Malvi 1 and Malvi 9 yield about 20 per cent more than the local mixture. Malvi 9 gins 32-34 per cent as against about 28 per cent in local. Malvi 9 spins about 40 per cent higher counts than local.

(b) *Cambodia* yields about 10 per cent more than the local mixture. It spins about 30 per cent higher counts than local.

(2) *Nimar tract*—Banilla will give the cultivator an immediate increase in return on account of its higher ginning percentage. Verum is lower yielding than the local mixture, but would pay if pooling and marketing facilities were provided.

(3) Gang Canal Colony, well and tank irrigated sandy lands in Rajputana:

Cawnpore 520 is a definite improvement on Mollisoni in the Gang Canal Colony, and will probably pay better than local on most irrigated sandy lands. Rosea Bhatia has given very high yields in Rajputana, but is very poor in quality. It is rather doubtful whether American types have any permanent place in Rajputana.

(4) *Bundelkhand*—The extension of cotton in this tract would be of very doubtful value. Yields in all trials carried out for the Institute have been extremely low owing to heavy boll shedding after untimely rains, and Pink bollworm attack. No recommendation can be made.

9. *Cotton—Physiology, Pathology and Agronomy*—A very large amount of data of varied character has been accumulated and is being reviewed. The following summary deals with only a small fraction of it.

(a) *Bio-chemical studies on Wilt*—Indications from the previous year's work regarding root relationships were confirmed thus—

(i) In the course of root soil together with the whole of it is being made to trace the cause simply confirmed that the presence of death, or even to any wilting no fungus could be found

Further examination of the root systems of pairs of healthy and wilted plants again showed less root activity in diseased plants than in healthy ones. A more detailed examination is being made, some of the results of which are tabulated.

TABLE 1—*Root activity of healthy and wilted cotton plants in relation to soil zones, 1933-34*

Average lengths in inches of active roots of Malva Cotton

(Based on root exposures of 21 plants).

Soil zones	Healthy	Wilted	P
0-9"	37.1	15.3	< 0.01
9"-18"	17.4	5.3	< 0.05 > 0.02
18"-downwards	10.6	8.9	> 0.05

Note.—

It seems that this weakening of root activity is located in the upper soil zones and it is from them that the plant's nutrition is chiefly derived. It appears that this is a concomitant of wilt.

(ii) Last year's observations on the periodicity of virulence were further extended and amplified. Periodicity in virulence is now established. This data is being examined in greater detail.

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d plants

TABLE 2—*Means percentage moistures in soils around the roots of healthy and wilted cotton plants*

A TOTAL MOISTURES

Depth of soil	Healthy plants	Wilted plants	Total
3"—6"	27.85	35.14	62.79
9"—12'	29.21	30.30	59.51
Total	56.86	65.44	122.3

Healthy < Wilted $P < 0.05$, Sig. diff. 7.21

A number of new selections from Malwa will be tested in replicated progeny rows this season and desirable progenies will be carried on and tested against the existing strains

Selection work on Malwa Upland cotton has been transferred to Badnawar (Dhar State) in the best Upland cotton growing district in Malwa

At Dhar progeny row selection has been initiated in a mass selected Malvi cotton maintained by the Agricultural Department and in the Nimar tract of Dhar State selection in the local Nimari bulk has given an immediate improvement of considerable magnitude

Thanks to the co-operation of the Agricultural Department Dhar State it has been possible to carry out the breeding work in all three of these centres by the replicated progeny row technique developed at the Institute

Malvi has been tested at the same time as the local Malvi at Dhar and at Badnawar. Hy

(f) *Variety Trials*—A large number of variety trials were carried out in the period under review. The potentialities of existing selected varieties for the different tracts of Central India and Rajputana are now fairly well known and may be summarised as follows

(1) Black soil tracts of Central India (Malwa plateau)

(a) Malvi 1 and Malvi 9 yield about 20 per cent more than the local mixture. Malvi 9 gins 32-34 per cent as against about 28 per cent in local. Malvi 9 spins about 40 per cent higher counts than local.

(b) Cambay 1 and 2 are also good varieties for the black soil tracts of Central India.

(2) *Nimar tract*—Banilla will give the cultivator an immediate increase in return on account of its higher ginning percentage. Verum is lower yielding than the local mixture but would pay if pooling and marketing facilities were provided.

(3) Gang Canal Colony well and tank irrigated sandy lands in Rajputana

Cawnpore 520 is a definite improvement on Mollisoni in the Gang Canal Colony and will probably pay better than local on most irrigated sandy lands. Rosea Bhatia has given very high yields in Rajputana but is very poor in quality. It is rather doubtful whether American types have any permanent place in Rajputana.

(4) *Bundelkhand*—The extension of cotton in this tract would be of very doubtful value. Yields in all trials carried out for the Institute have been extremely low owing to heavy boll shedding after untimely rains and Pink bollworm attack. No recommendation can be made.

9 *Cotton—Physiology Pathology and Agronomy*—A very large amount of data of varied character has been accumulated and is being reviewed. The following summary deals with only a small fraction of it.

(4) *Bio-chemical studies on wilt*—Indications from the previous year's work regarding root relationships were confirmed thus—

(i) In the course of root studies healthy and wilted plants were removed from the soil together with the whole of their root systems. Microscopic examination of this material is being made to trace the course of infection. This work is not finished but it has been amply confirmed that the presence of fungus in a plant does not necessarily lead to its death, or even to any wilting. On the other hand wilting followed by death occurred when no fungus could be found.

Further examination of the root systems of pairs of healthy and wilted plants again showed less root activity in diseased plants than in healthy ones. A more detailed examination is being made some of the results of which are tabulated.

TABLE 1—*Root activity of healthy and wilted cotton plants in relation to soil zones 1933/34*

Average lengths in inches of active roots of Malva Cotton

(Based on root exposures of 21 plants)

Soil zones.	Healthy	Wilted	P
0-9"	37.1	15.3	< 0.01
9"-18"	17.4	5.3	< 0.05 > 0.02
18"-downwards	16.6	8.9	> 0.05

Note—In this and subsequent tables when P is shown as less than 0.05 the odds in favour of the validity of the result shown are 20 to 1; if less than 0.01 the odds are 100 to 1. When P is greater than 0.05 the odds are less than 20 to 1.

It seems that this weakening of root activity is located in the upper soil zones and it is from them that the plant's nutrition is chiefly derived. It appears that this is a concomitant of wilt.

(ii) Last year's observations on the periodicity of virulence were further extended and amplified. Periodicity in virulence is now established. This data is being examined in greater detail.

(iii) *Soil moisture relations and wilt*—Total and hygroscopic moistures were determined at intervals in the field in two zones around the roots of healthy and wilted plants. Results are given in Table 2—A B C.

TABLE 2—*Means percentage moistures in soils around the roots of healthy and wilted cotton plants*

A TOTAL MOISTURES

Depth of soil	Healthy plants	Wilted plants	Total
3"-6"	27.65	35.14	62.79
9"-12"	29.21	30.30	59.51
Total	56.86	65.44	122.3

Healthy < Wilted P < 0.05 Sig. diff. 7.21

B HYGROSCOPIC MOISTURE.

Depth of soil	Healthy plants	Wilted plants	Total.
3"—6"	9.7	12.9	22.6
9"—12"	11.6	10.8	22.4
Total ..	21.3	23.7	45.0

Interaction of depth with healthy and wilted plants—

Moisture values $P < 0.05$, Sig diff 2.72.

C. RATIOS OF MEAN PERCENTAGE MOISTURES FOR TWO DEPTHS AROUND THE ROOTS OF HEALTHY AND WILTED COTTON PLANTS

Ratio	Healthy plants	Wilted plants	P.	Significant difference.
$\frac{9"-12"}{3"-6"}$	1.05	0.90	< 0.05	0.14

The hygroscopic moistures of the upper soil zones were higher around wilted plants than healthy ones (B).

Leaf samples from healthy and wilted plants were collected and are awaiting analysis, to locate the changes in the metabolism of the plants brought about by reduced root activity.

(iv) *Nutrition and cotton wilt*—Another line of investigation started in 1933 was as follows:—

Soils both in pots (1933 and 1934) and in the field (1934) were treated with—

- (i) inorganic nutrients in different proportions,
- (ii) manures of widely different compositions and properties and
- (iii) dressings of substances calculated to effect a physical improvement of the soil

The cotton period of the same the 1933 experiments were given

Different degrees of virulence were observed in different treatments in fields and pot cultures. Some of the results are given below.

TABLE 3—Effect of nutrients on incidents of Will

Treatments		1933-34	1934-35	Increase in death % in 1934-35 over 1933-34
1	N (NH_4 & NO_3) Ratio ammoniacal N to nitrate N 1 : 1	50.0	100.0	+ 50.0
2	N + P_2O_5	50.0	91.7	+ 41.7
3	K_2O + P_2O_5 (1 : 1)	25.0	80.0	+ 55.0
4	CaO	16.7	65.2	+ 48.5
5	K_2O + P_2O_5 ($\frac{1}{2}$: 1)	8.3	41.6	+ 33.3
6	K_2O + P_2O_5 (1 : $\frac{1}{2}$)	8.3	33.3	+ 25.0
7	MgO	0.0	40.2	+ 40.2
8	Compost	0.0	20.2	+ 20.2
9	Glue	0.0	10.2	+ 10.2
10	Farm Yard manure	50.0	42.8	— 7.2
11	Control	19.4	12.2	— 7.2
	P	< 0.5	< 0.5	
	Sig diff	27.2	30.8	

Salts used were ammonium nitrate for N, Potassium sulphate for K_2O , Sodium phosphate for P_2O_5 .

In the series with added nutrients the same relative differences were observed successively for two years. Some treatments have increased and others have decreased the virulence. In 1933 the highest virulence was induced by nitrogen alone and with phosphate it increased considerably in 1934. Potash with phosphate (1 : 1) in 1933 did not increase virulence significantly but in 1934 this treatment reached the level in this respect, of the nitrogen alone and with phosphate.

When the ratio of potash and phosphate was altered in either direction the increase of virulence in 1934 did not reach significance though reduction in potash nearly did so.

Magnesia and lime did not differ from control in 1933 but gave a significant rise in virulence in 1934 of the same order as potash and phosphate ($\frac{1}{2}$: 1).

Compost and glue in both years showed no significant difference from farm yard manure and control though the first pair showed a numerical rise in virulence in 1934 and the second pair a fall.

An excessive supply of nitrogen seems to be very powerful in increasing susceptibility. A study of the cumulative effect of several treatments is perhaps likely to give further information as to the nature of the balance between soil components which determines resistance or susceptibility.

(b) The yield of cotton as influenced by wilt incidence.—In order to discover whether

the yield is influenced by differences between yields significant but it is yet by picking

TABLE No 4—Influence of 'Wilt' on cotton yield

KAPAS GMS PER PLANT

Healthy plants		Mean yield	Companion	N	T	P
A	From unaffected patches	17 05	A Vs. B	47	1 7	> 00
B	From affected patches	12 0	A Vs. C	45	4 89	< 01
			A Vs. D	40	4 48	< 01
	Wilted plants		B Vs. C	54	4 7	< 01
C	Dead	4 3	B Vs. D	49	4 3	< 01
D	Resumed fresh growth	4 2	C Vs. D	47	009	> 00

(b) Cotton nutrition in relation to environment

(Yield)

(i) Soil type The influence of sowing date on yield was reported last year, that of soil type was then investigated in lysimeters filled with field soil, zone by zone as it exists in nature. The soils used were

(1) Jaipur sandy soil

(2) Soil of the Badnawar tank areas in Dhar State (noted for good Cambodia cotton)

(3) Black soil well drained but shallow (about 2 to 3 feet) from Institute Field 31

(4) Light grey-coloured deep soil (about 15 feet) well-drained from Institute Field 40

In 1933 Cambodia (Indore 1) and Malvi (No 9) cotton were sown no manure was given and after the monsoon rain water was applied as required hence the intrinsic differences in productivity and varietal suitability of the soils were the only operating factors. The relative exhaustion of these soils by the cotton crop was measured by growing a second crop of the same varieties in 1934. Again no manure was given nor any water after the cessation of rains which were exceptionally copious.

In this and the next three experiments which were in the nature of *scalers* the data given in Tables 5 to 8 are not capable of statistical examination.

TABLE 5—Calculated yield of seed cotton in gms per 100 sq ft in Lysimeters—1933 and 1934

Variety	Soil 1		Soil 2		Soil 3		Soil 4	
	1933	1934	1933	1934	1933	1934	1933	1934
Indore 1	289	15	1332	113	110	0	237	7
Malvi 9	449	218	1104	250	212	169	431	232

In 1933 soil 4 yielded more than itself. In general there

pected from seasonal var.

20 per cent 4"

Soil 2 (Jaipur)

The Cambodi

Badnawar

used at Badnawar seen

very heavy manuring given—

custom inherited from the opium crop practice by its present successor. The deterioration of this soil through one crop of cotton is more serious than that of ordinary black cotton soils and it is questionable how for the current practice is sound.

(ii) *Humus supply*—It was reported in 1934 that yields of Malvi increased when manure was applied to the whole profile in strong contrast with the insignificant yield differences from field crops surface dressed.

Cotton—Cambodia (Indore 1) and Malvi (No. 9) was grown in the same manured profile plots in 1934 to ascertain the continuity of the effect of profile application with the following results—

TABLE 6—Calculated yields of seed cotton in gms per 100 sq ft in manured profile plots in 1933 and 1934

Treatment	Malvi 9		Indore 1 1934
	1933	1934	
No treatment	1170	650	164
Farm Compost	2167	1306	749
Farm Yard Manure	1860	910	615
Municipal Compost	2376	1192	547

In 1933 manures were mixed throughout the profile down to murum—18.24 inches in depth. In 1934 they were given as surface dressings at 10 tons per acre.

Because of a difference in plant spacings the yields for the two years should not be compared together but the order of productive capacity of treatment may be contrasted.

The 1934—... than the control that the effect of profile is noteworthy that farm plots have changed places on soils both manured

and unmanured is clearly indicated.

(iii) *Soil texture*—The influence of open surface texture reported last year was tested for residual effect a cotton crop being sown again on the same plots with the following results—

TABLE 7—Soil texture and cotton yield—1933 and 1934. Calculated yields of seed cotton in gms per 100 sq ft

Variety	Unmanured			Manured		
	Control	Heated soil		Control	Heated soil	
		6" surface layer	50% in 6" surface layer		6" surface layer	50% in 6" surface layer
Year 1933						
Indore 1	221	456	608	277	762	975
Malvi 9	658	1164	801	910	1339	1174
Year 1934						
Indore 1	163	26	123	143	115	95
Malvi 9	215	375	347	232	222	144

In 1933, in unmanured plots, the 50 per cent heated soil treatment gave the highest yield with Cambodia, and the full 6 inches layer treatment with Malvi. The response to manures for Cambodia was considerably higher in the plots treated with heated soil than in the control. Malvi responded to manure better than Cambodia on untreated plots. yields in the same way and to a greater extent than does manuring. With Cambodia, however, open texture was an essential factor for any increase in yield with or without manures.

All yields fell in 1934, but the fall was least with Cambodia in the untreated plot without manure. The greatest reduction in yield was observed in the heated soil treatment for Cambodia.

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however the same for both varieties showing clearly the superiority of humus in raising yields. It is also evident that about six inches depth of soil of open texture brings a higher response to manures.

(iv) *Nutrients*—In spite of negative results from field trials in 1931 and 1932, the results set out above clearly indicated the possibility of a favourable response to manures under certain soil conditions. A qualitative test was made in 1933 in pot-cultures to find what nutrients were most likely to induce response. The 92 pots were filled with uniformly graded surface soil treated in bulk with their respective nutrients. The experiment was done in duplicate with Cambodia (Indore 1) and Malvi 9 cotton.

In 1934 another experiment was made with four replications using 192 pots, to test the effect of the more promising nutrients upon soils treated to bring about differences of texture by flocculation.

The results are shown in Table 8, A to F.

TABLE 8—Differences in response of Cambodia, Indore 1 and Malvi 9 to nutrients

A—MAXIMUM RESPONSE—1933 EXPT

Influence on	Indore 1			Malvi 9		
	Treatment.	Control	Wts. or hts. max.	Treatment.	Control.	Wts. or hts. max.
Yield of bales	am. sulph. in 2 doses	1.2	21.2	am. sulph. + di. acid hyd. phosph.	2.6	19.3
Plant weight after 42 days	am. sulph. + di. acid hyd. phosph. + pot. sulp. h. 1 dose	2.7	13.0	am. sulph. + di. acid hyd. phosph. + pot. sulph. 1 dose	1.8	7.2
Final height after 123 days	am. sul. h. in 2 doses	9.75	19.5	am. sulph. + di. acid hyd. phosph. in 1 dose	11.0	44.25

B—DEPRESSING INFLUENCES OF TREATMENTS

Depression in	Treatments.	
	Indore 1	Malvi 9
Yield of <i>kafas</i>	Nil	am sulph 1 dose
Plant weight at 43 days	am sulph + pot sulph 2 doses Pot sulph 1 dose and 2 doses sod nitrate 2 doses	Sod nitrate 1 dose pot sulph 2 doses di sod hyd phosph 1 dose am sulph 2 doses
Final height	Di sod hyd phosph 1 dose and 2 doses pot sulph 2 doses	Pot sulph 1 dose

C—MODIFYING INFLUENCE OF COMPONENTS OTHER THAN THE NUTRIENT ELEMENTS

	Yield		Plant weight		Final height	
	Indore 1	Malvi 9	Indore 1	Malvi 9	Indore 1	Malvi 9
<i>Nitrogen alone</i>						
am sulph 1 dose	9 1	1 7	6 0	1 4	13 75	23 0
sod nitrate 1 dose	8 3	4 6	5 7	1 6	14 5	21 5
calc nitrate 1 dose	8 7	11 85	3 9	2 4	14 5	34 0
<i>Phosphates alone</i>						
di sod hyd phosph 1 dose	5 3	6 45	3 8	1 2	8 5	13 5
super phosph 1 dose	7 8	8 0	2 9	2 1	13 5	18 0
am sulph. + di sod hyd phosph 1 dose	7 2	19 3	7 0	5 4	11 5	44 25
<i>Nitrogen plus phosphate</i>						
am sulph + di sod hyd phosph 1 dose	7 2	19 3	7 0	5 4	11 5	44 25
Nicifos 17/45	12 5	16 25	3 3	3 4	15 25	29 0
Nicifos 22/18	11 9	11 20	10 1	2 2	12 5	18 0

D—INFLUENCE OF ONE NUTRIENT ELEMENT ON ANOTHER

	Yield		Plant weight		Final height	
	Indore 1	Malvi 9	Indore 1	Malvi 9	Indore 1	Malvi 9
am sulph + di sod hyd phosph 1 dose	7 2	19 3	7 0	5 4	11 5	44 25
am sulph + pot sulph 1 dose	4 90	4 0	6 6	3 1	13 0	18 5
am sulph + pot sulph + di sod hyd phosph 1 dose	14 1	3 9	13 0	7 2	14 5	30 0

E—COMPLETE NUTRIENT IN DIFFERENT FORMS AND WITH DIFFERENT RATIOS NK

 P_2O_5

	Ratio N K_2O P_2O_5	Yield		Plant weight		Final height.	
		In dore 1	Malvi 9	In dore 1	Malvi 9	In dore 1	Malvi 9
Safflower cake	1 0 33 0 66	17 0		6 4	3 5	14 0	
Municipal compost	1 14 17	11 0	14 6	5 4	3 5	11 0	22 25
Farm compost	1 34 0 58	6 5	6 10	6 4	2 1	10 0	18 0
Farm yard manure	1 39 17	5 6	7 3	4 2	2 9	14 5	16 0

F—MODE OF APPLICATION ONE AND TWO DOSES

		Yield		Plant weight		Final height.	
		In dore 1	Malvi 9	In dore 1	Malvi 9	In dore 1	Malvi 9
am sulph	1 dose	0 1	1 7	6 0	1 4	13 75	23 0
	2 doses	21 2	14 4	3 6	1 7	19 5	25 0
sod nitrate	1 dose	8 3	4 6	5 7	1 6	14 5	21 5
	2 doses	11 4	7 2	2 1	2 6	13 0	16 75
di sod hyd phosph	1 dose	5 3	6 45	3 8	1 2	8 5	13 5
	2 doses	4 20	3 0	2 8	3 8	9 0	11 5
am sulph + di sod hyd phosph	1 dose	7 2	19 3	7 0	5 4	11 5	44 25
	2 doses	7 7	7 7	10 3	2 2	15 5	25 5
pot. sulph	1 dose	4 97	4 40	2 1	2 6	14 0	10 5
	2 doses	6 0	5 5	8 25	1 2	8 25	13 0
am sulph + pot sulph + di sod hyd phosph	1 dose	14 1	3 9	13 0	7 2	14 5	30 0
	2 doses	6 6	13 75	6 5	6 0	15 25	31 75
am sulph + pot sulph	1 dose	4 80	4 0	6 6	3 1	13 0	18 5
	2 doses	3 15	6 10	2 1	3 9	12 5	16 0

The following points were brought out by these pot-cultures —

(1) The greatest plant weights for both varieties within a period of 43 days from germination were produced by complete nutrients given in one dose

(2) Maximum *Aspas* yields of Cambodia however were given with ammonium sulphate in two doses and of Malvi 9 with a mixture of ammonium sulphate and di sodium hydrogen phosphate in one dose

(3) Maximum heights were given by those treatments which gave maximum yields

(4) The yield of Cambodia was increased by all treatments. Ammonium sulphate in one dose however depressed it for Malvi 9

(5) Plant weights at 43 days and final heights were lower than control with some treatments.

(6) Nutrients applied in different combinations gave different results to the varieties not always responding in the same way. The results of the present series were similar and many treatments differing in the proportions of plant nutrients gave similar results and some gave the same result as that from a combination.

Absolute values (plant weights for the varieties at the final growth height) do not show any consistent relation to the total yield. The effect of a nutrient is determined by the presence or absence of other elements in the soil and plant tissue. The combinations of nitrogen and phosphorus had a beneficial effect on Malvi 9 as did a certain treatment on Cambodia. Different ratios between elements applied in the same form have different effects but such different effects can also be produced by varying the same ratio but in different forms.

For both the varieties the application of nitrogen and in some degree potash in two doses is better than in one dose but two applications of phosphorus will have the reverse effect. Combinations of nitrogen and potash and nitrogen and phosphorus gave better results with Cambodia when applied in a single dose but with Malvi 9 it was the reverse. Nitrogen and phosphorus are better in one dose combined on Malvi 9 but on Cambodia there is no difference between one and two doses.

An effective system of manuring will have to be based upon the correct intensity of nutrient supply especially of nitrogen and to a less extent phosphorus in the early and later stages of growth.

The effect of the unabsorbed residues of the chemicals used (sulfuric acid, etc.) is known to be indirect through their modifying influence on the physical condition of soil, hence it seemed necessary to determine the soil texture suitable for the utilization of the nutrients.

The results of the 1934 experiment which was intended to give further information in this direction are tabulated below.

TABLE 9—Texture differences and nutrient efficiencies for cotton 1934-35
Yield of seed cotton and plant weights are given in gms per plant and heights in inches

A—INDORE I

Treatment	No Treatment			Compost			Acid			Compost + Acid		
	Yield Kaps	Final plant weight	Final plant height	Yield Kaps	Final plant weight	Final plant height	Yield Kaps	Final plant weight	Final plant height	Yield Kaps	Final plant weight	Final plant height
N	2.5	9.0	7.6	4.2	14.8	11.9	2.8	5.6	3.9	8.7	25.4	11.7
NP	4.8	7.0	7.8	11.0	40.3	22.5	4.6	11.0	10.0	8.9	27.1	16.6
P	10.7	68.0	12.3	6.8	21.0	15.8	2.5	7.0	6.4	4.9	8.8	10.4
K	7.7	15.0	16.8	19.2	75.2	20.3	6.3	8.0	9.9	6.6	10.5	13.9
NP	15.6	41.9	20.2	15.7	93.6	26.4	7.0	13.1	14.1	7.6	15.7	14.2
NK	6.6	19.8	20.4	22.7	65.0	21.7	0.0	4.4	14.2	11.7	23.8	20.4

B—MALVI 9

Treatment	No Treatment			Compost			Acid			Compost + Acid		
	Yield Kaps	Final plant weight	Final plant height	Yield Kaps	Final plant weight	Final plant height	Yield Kaps	Final plant weight	Final plant height	Yield Kaps	Final plant weight	Final plant height
N	2.8	5.2	13.0	6.3	13.1	22.4	1.3	1.7	16.1	5.0	26.2	33.5
NP	3.2	28.8	11.0	13.9	75.1	66.7	4.0	10.0	20.7	12.1	22.3	28.7
P	2.7	15.7	21.2	6.3	25.2	26.6	1.3	4.0	12.5	8.8	8.7	21.6
K	2.3	4.2	15.0	9.9	25.3	31.2	6.4	20.1	10.9	8.6	21.5	31.1
NP	15.2	77.8	22.2	12.7	57.7	59.6	7.2	18.3	20.9	8.7	19.2	34.4
NK	3.9	23.6	25.8	13.4	61.0	50.7	3.2	7.0	17.0	6.6	61.2	49.4

E—COMPLETE NUTRIENT IN DIFFERENT FORMS AND WITH DIFFERENT RATIOS NK
P₂O₅

	Ratio	Yield		Plant weight		Final height	
	N K ₂ O P ₂ O ₅	In dore 1	Malvi 9	In dore 1	Malvi 9	In dore 1	Malvi 9
Safflower cake	1 0 33 0 66	17 0		6 4	3 5	14 0	
Municipal compost	1 14 17	11 0	14 6	5 4	3 5	11 0	22 20
Farm compost	1 34 0 58	6 5	6 10	6 4	2 1	10 0	18 0
Farm yard manure	1 39 17	5 6	7 3	4 2	2 9	14 5	16 0

F—MODE OF APPLICATION ONE AND TWO DOSES

		Yield		Plant weight		Final height	
		Indore 1	Malvi 9	Indore 1	Malvi 9	Indore 1	Malvi 9
am sulph	1 dose	9 1	1 7	6 0	1 4	13 75	23 0
	2 doses	21 2	14 4	3 6	1 7	19 5	25 0
sod nitrate	1 dose	8 3	4 6	5 7	1 6	14 5	21 5
	2 doses	11 4	7 2	2 1	2 6	13 0	16 75
di sod hyd phosph	1 dose	5 3	6 45	3 8	1 2	8 5	13 5
	2 doses	4 20	3 0	2 8	3 8	9 0	11 5
am sulph + di sod hyd phosph	1 dose	7 2	19 3	7 0	5 4	11 5	44 25
	2 doses	7 7	7 7	10 3	2 2	15 5	25 5
pot. sulph	1 dose	4 97	4 40	2 1	2 6	14 0	10 5
	2 doses	6 0	5 5	8 25	1 2	8 25	13 0
am sulph + pot sulph + di sod hyd phosph	1 dose	14 1	3 9	13 0	7 2	14 5	30 0
	2 doses	6 6	13 75	6 5	6 0	15 20	31 75
am sulph + pot sulph.	1 dose	4 90	4 0	6 6	3 1	13 0	18 5
	2 doses	3 15	6 10	- 1	3 9	12 5	16 0

The following points were brought out by these pot-cultures —

(1) The greatest plant weights for both varieties within a period of 43 days from germination were produced by complete nutrients given in one dose

(2) Maximum *Apas* yields of Cambodia however were given with ammonium sulphate in two doses and of Malvi 9 with a mixture of ammonium sulphate and di sodium hydrogen phosphate in one dose

(3) Maximum heights were given by those treatments which gave maximum yields

(4) The yield of Cambodia was increased by all treatments Ammonium sulphate in one dose however depressed it for Malvi 9

MALVI (No 9) COTTON

(i) Nitrogen has no influence on yield and flocculation by acid or the addition of potash makes little difference but in combination with phosphate the yields almost become five-fold and reach the maximum for the variety. Compost gives nearly twice as much yield as nitrogen but a combination of compost with nitrogen raises the yield to four times that from nitrogen alone.

(ii) Like nitrogen, potash and phosphate alone had no influence on yield.

(iii) Flocculation by acids has no influence except in the presence of nitrogen and phosphate together or potash alone. Compost however reduces the response to nitrogen plus phosphate by 20 per cent. and with acid flocculation the yield is further reduced by 25 per cent. to the level of yields from acid alone. In combination with nitrogen acid flocculation raises the yield one and a half times but further addition of compost to the combination gives further increase to three times.

This probably indicates that any favourable influence of compost on Malvi 9 is through its power to supply nutrient and not so much to its effect upon moisture relation.

It appears that the conditions produced by compost in presence of all added nutrients are favourable for Cambodia but definitely unfavourable for Malvi, when the added nutrient is a combination of nitrogen and phosphate.

If the drying effect of compost alone on the soil is assumed to be less powerful on the soil than that of acid flocculation, it may be concluded that compost keeps the moisture at adequate levels except when, as with Malvi 9 treated with nitrogen and phosphate, the demand becomes too high.

TABLE 10—Influence of green manure on the yields of wheat and cotton at Indore

Variety—Malvi 1

Yield in lbs per acre

Yield of	Green manures cut and removed				Green manures ploughed in						Significant difference
	Black gram.	Sann.	Soya beans	Cow peas	Black gram.	Sann.	Soya beans	Cow peas	Fal low	P	
Total yield —											
Wheat, 1932	635	677	472	597	604	558	654	479	475	< 0.05	104
Cotton, 1933	540	522	517	517	588	528	566	466	442	> 0.05	—
Yield of two pickings of cotton (1st & 2nd)	281	267	243	263	291	254	251	245	172	< 0.05	54

V—HUMUS SUPPLY (FIELD SCALE)

Some of the investigations described in paras (i) to (iv) above have also been studied under field conditions—the results are summarised below under the same headings. Green manuring followed by wheat in the same year and subsequently by cotton gave higher total yields with wheat but not significantly with cotton though the first two pickings yielded better with green manure. The rainfall was very heavy (51.82 inches) and it is possible that in normal years increases may also be obtained with total yields (Table 10).

VI—SOIL TEXTURE

Both Malvi 9 and Cambodia Indore 1 did not respond significantly to field applications of heated soil at five or twenty cartloads per acre. The doses were much smaller than those used for the small plots mentioned above. A test is being made to find the effect of heavier applications within the range of practicability.

Similarly in another field test flocculation by sulphuric acid gave no yield differences even when repeated twice during the crop period. Superphosphate behaved similarly.

The steady maintenance of favourable moisture conditions resulting from open texture cannot be brought about in Indore soils by mechanical means to ensure good drainage conditions. An experiment repeated for three years consistently gave no significant differences in yields when attempts were made to keep open texture by providing shallow furrows at different intervals between rows of the growing crop to regulate drainage and soil aeration.

In the last three years very heavy rains spoiled several field experiments aimed at estimating the influence on the yields of cotton and other crops of —

- (1) Previous crop
- (2) Interculture to keep mulches of different depths
- (3) Weeding
- (4) Intersowing of other crops

The last year's experiment shows a significant detrimental influence due to absence of weeding even when the rains have depressed the yields of the cotton crop to the lowest limit.

TABLE 11 — *Response of common crops to interculture and weeding 1932-34*

Yields in lbs per acre

A CROP—COTTON

Year	Hand weeding only	Indore ridge and weeding	Daura & weeding	Guntaka & weeding	P	Significant difference
1932	265	270	225	248	> 0.05	—
1934	229	282	312	254	> 0.05	—

B CROP—JOWAR (*Sorghum*)

1932						
Grain	149	148	251	216	< 0.05	48
Straw	4340	4300	4280	3900	< 0.05	497
1934						
Grain	373	352	409	368	> 0.05	—
Straw	1897	2068	2166	1971	> 0.05	—

* Dry stems and leaves.

C. CROP—TUR (*Cajanus indicus*—pigeon pea)

Year	Hand weeding only	Ridger and weeding	Daura and weeding	Guntaka and weeding	P	Significant difference
1933						
Grain	655	615	660	670	> 0.05	—
Bhusa*	550	483	553	600	> 0.05	—

* Straw and chaff

D. CROP—COWPEAS

1933						
Grain	135	116	146	130	> 0.05	—

F. CROP—WHEAT

1933						
Grain	330	343	251	228	> 0.05	—
Bhusa	492	555	464	451	> 0.05	—

F—INFLUENCE OF INTERCULTURE AND WEEDING ON COTTON (1933) VARIETY—MALVI
BULK—LB PER ACRE

Ridger and weeding	Ridger no weeding	Daura and weeding	Daura no weeding	Weeding alone	No weeding	P	Sig diff
105.2	10.4	86.4	2.1	60.1	3.1	< 0.05	50.4

Shallow interculture either by Daura or Guntaka benefitted the jowar crop in 1933. This seems to be due more to the effective weeding done by these implements than to their capacity to produce a mulch. This has been confirmed by the results of another experiment in 1933.

TABLE 12—Yield and growth of jowar as influenced by weeding and interculture

Yields in lb per acre

1933

VARIETY—JOWAR MALVI

	Ridger		Daura		No interculture			Sig diff
	Weeding	No weeding	Weeding	No weeding	Weeding	No weeding	P	
Grain	181	161	137	100	198	59	< 0.05	43.7
Kadbi	1934	1559	2259	2125	2334	1950	< 0.05	407.8

The influence of cultivation during the cold weather on the crops of the following season has been studied since 1932. The types of cultivation compared were —

- (1) Opening the soil surface to about three inches *dest* plough
- (2) Subsoiling
- (3) Soil inversion—Ransome's CT 2 plough and
- (4) Subsoiling followed by opening the soil surface with the *dest* plough

The experiment has not yet run sufficiently long to show cumulative effects. Heavy rains in the last two years have depressed the cotton crop.

TABLE 13 — *Yield response of common crops to winter cultivation*

Yield—in lb per acre

A CROP—COTTON

Year	No cold weather cultivation	Country plough	Sub soiler	Inversion plough	Sub soiler & country plough	P	Sig diff
1932	160	108	138	140	148	> 0.05	—
1934	61	47	72	49	49	> 0.05	—

B CROP—JOWAR

1932 Chara*	17 430	17 310	16 310	17 110	19 450	> 0.05	—
1934 Grain	319	204	335	218	263	> 0.05	—

* The whole crop cut green

C CROP—GROUNDNUT

1933 Nuts	418	334	423	330	351	> 0.05	—
Dhusa	700	655	722	563	608	> 0.05	—

D CROP—COWPEAS

1933 Grain	95	79	106	80	83	> 0.05	—
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E. CROP—WHEAT

Year	No cold weather cultivation.	Country plough	Sub-soiler	Inversion plough	Sub-soiler and country plough	P	Sig diff
1933							
Grain	646	554	612	9*6	22	>0 05	—
Bhusa	1,548	1 573	1 614	1 6*8	1 563	>0 05	—

So far as the results go however there seems to be no immediate effect of any type of inter-cultivation on the succeeding crop

VII NUTRIENTS (field scale)

At Indore a complex experiment with six factors was carried out on Malvi 9 cotton in a rich field. The general cotton yields of 1934 were very low and the results obtained are naturally indicative of what may be expected in similar seasons. The following comparisons with their interactions were included —

- (1) different depths of interculture (*dauva* or Indore ridger)
- (2) row spacings (14 and 21 inches)
- (3) artificial manure
- (4) organic and inorganic manure (Safflower cake and Nicofos 22/18)
- (5) Units of nitrogen ($7\frac{1}{2}$ and 15 lb per acre) and
- (6) method of application (broadcast and drilled)

TABLE 14 — *Response of Malvi 9 to manures—1934*

Yield—lb per acre

With manures	Without manures	P	Sig diff
448	363	<0 05	40 1

Significant differences in yields were obtained only by manuring. Unless it is found otherwise a great latitude seems to be available for choosing manure (the differences between which were 1 lb per acre could perhaps be reduced to 5 lb per acre). The labour of application

At Dhar, however, yields of Malvi cotton were depressed by safflower cake while the higher yields obtained from Nicifos (22/18) though high enough to be significant to cake were not quite significantly different from control. This experiment was located on shallow eroded soil on the lower slope of a hill and hence liable to severe run off. Under such condition the utility of manure is not likely to be great.

With Cambodia (bulk seed) there was an opposite result, safflower cake gave significantly higher yields than both control and Nicifos (22/18).

TABLE 15—Yield differences due to manures

DHAR 1934

lb kapas per acre

Variety	Treatments			P	Sig diff
	Control	Nicifos 22/18	Safflower cake		
Malvi bulk	630	692	541	<0.05	89.9
Cambodia bulk	403	391	474	<0.05	43.8

A similar experiment at Jaipur with Cambodia Indore 1 in addition to confirming the superiority of earlier sowings recorded in 1934 showed yield depression with Nicifos (22/18) while as at Dhar the higher yields of the cake treatment did not reach significance.

TABLE 16—Sowing dates and yield of cotton

JAIPUR 1934

Variety Cambodia Indore 1	April	May	Rains	P	Sig diff
Yield in lb kapas per acre	982	681	209	<0.05	189

TABLE 17—Manure and yield of cotton

JAIPUR 1934

Variety Cambodia Indore 1	Control	Castor cake	Nicifos 17/45	P	Sig diff
Yield in lb kapas per acre	651	831	497	<0.05	266

The high yields are observed to be due to a low level of pre-sowing plots.

It will be seen that the response of Cambodia is due to the fact that at a low level in pot cultures the concentration of phosphorus in the soil is low. Cambodia soil in Malwa cotton responds better to a single dose of fertilizer than soil with phosphorus. The response to nutrients depends upon the soil texture and the available nutrient capacity.

In nutrient tests at Indore and Jaipur reported in a paper* it has been shown that a indication of the same nature exists in Malwa and Jaipur soil. The better response of Cambodia is due to the fact that at Jaipur the soil is more fertile than in the field.

It is quite clear from the foregoing results that for the present concentration is likely to be profitable only on the basis of the results in cotton nutrition and manuring.

Rotation for cotton—The experiment was started in 1932 and subsequently recast in 1933. It comprises five alternative rotations of cotton with jowar, tur, groundnut, cowpeas and wheat. Started at two points the full cycle will be complete in 1936 and will then be reported. The separate experiment—the influence on cotton of seven different preceding crops—has been completed but results are not yet examined. The cotton plots of 1934 yielded very low.

(c) *Cotton nutrition in relation to environment*—Quality—The data from pot cultures of 1934 are not yet statistically examined. They deal with the influence of soil texture, humus supply and nutrients upon the lint length and ginning percentage of Cambodia and Malwa cottons.

Similar data however from field experiments at Dhar and Jaipur are discussed below.

Cambodia—The influence of environment on staple length was determined on the seed cotton obtained from each treatment in the Jaipur experiment with the following results (Table 18) A to D.

TABLE 18
Influence of environment on staple length—Jaipur 1934

Variety—Cambodia Indore 1

A

Mean staple length in mm

Manure						No manure	
Sowing dates	Castor cake		Nifos 17/45		Plant spacing		
	Plant spacings				12 in	18 in	
	12 in	18 in	12 in	18 in			
	April	25.6	21.8	24.8	24.2	22.3	22.6
May	24.8	24.8	24.6	23.0	23.5	23.0	
On rains	23.0	22.7	26.1	24.7	24.9	25.5	

* Nitrogen balance in Black soil. III. Wad V. D. and Arangabhar R. N. Report Proc. Ind. Sci. Cong. (in publication)

Rates of manures applied : 21 lb of N per acre, i.e., 6 cwt of castor cake (N=3%) or 150 lb of Nicifos 17/45 per acre

Significances

Treatment	P.	Sig diff. for the mean
Sowing dates	<0.01	
Manure v no manure	<0.05	
Spacings	<0.05	
B — Sowing dates × (manure v no manure)	<0.01	0.35
C — Sowing dates × (cake v Nicifos 17/45)	<0.01	1.50
D — (Manure v no manure) × Spacing	<0.05	1.20

B

Mean staple length in mm

Sowing dates × (manured v. unmanured).

Manured			Unmanured		
April	May	Rains	April	May.	Rains
24.1	24.3	24.3	22.5	23.2	25.2

C

Sowing dates × quality of manure

Castor cake			Nicifos 17/45		
April	May	Rains	April	May	Rains.
23.7	24.8	23.2	24.5	23.8	25.5

D

(Manured v unmanured) × plant spacings

Manured		Unmanured	
Plant spacings		Plant spacings	
12 inches	18 inches	12 inches	18 inches
24.0	23.5	23.6	23.7

The use of manure has maintained a steadier and higher level at almost all sowing dates closer spacing nearly always giving a longer staple. Without manure staple length diminished with each earlier sowing equally for both spacings. Rain sown crops with Nicifos or no manure gave higher levels. The kind of manure had different effects at different sowing dates.

Castor cake gave a longer staple on the May sown crop than that sown on runs but Nicifos raised the staple length of rain sown cotton to the highest level in the trial.

Considering the following points —

- (1) the rates of nitrification of inorganic and organic manures
- (2) the differences in moisture in hot weather and monsoon,
- (3) the higher rate of nitrification in hot weather and
- (4) the differences in evaporation of soil moisture due to spacing during the boll-developing stage i.e. after the runs cease it appears that an ample supply of nitrogen with sufficient moisture in the early stages has a favourable influence on staple length.

The results obtained on staple length of the Cambodia crop in the Dhar experiment are given below.

TABLE 19

Influence of environment on staple length—Dhar 1934

Variety—Cambodia

Staple length in mm

Plant spacing	Single unit of manure *	Double unit of manure †	No manure	Mean for spacing
12 inches	19.1	20.9	19.3	19.8
18	18.8	18.6	18.7	18.7

Significance

Plant spacings— $P < 0.05$ sig. diff. ≈ 1.0 mm

Plant spacings \times (Cake v. Nicifos 22/18)

Experimental Z = 0.7187 Z required ≈ 0.720 for $P = 0.05$

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This also confirms the suggestion of the favourable effect of initial moisture supply and of soil moisture during boll development.

* Single unit 7½ lb N per acre i.e. 220 lb of 33½% cake (N = 6.6%) or 42 lb Nicifos 22/18 per acre

† Double unit double the above quantities

The results were much more definite in the Dhar experiment with the harder Malvi cotton. They are tabulated below:—

TABLE 20

A Mean staple length in mm

Plant spacings	Manure				No manure
	Safflower cake		Nicifos 22/18		
	Single unit *	Double unit †	Single unit	Double unit	
12 inches	19.3	19.2	17.1	18.5	18.6
18 ..	19.2	19.3	16.2	19.0	16.2

Significances.

	P
Manure v no manure	<0.01
Quality of manure	<0.01
Units of manure	<0.05
Quality × units of manure	<0.05
Spacings	<0.01
B Spacings × units of manure	<0.01

Sig diff = 0.89

C. Spacings × quality × units of manure <0.01

Sig diff = 1.2 mm

B

Mean staple length in mm per plot

Plant spacings × units of manure

Plant spacing 12 inches			Plant spacing 18 inches		
No manure	Single unit	Double unit	No manure	Single unit	Double unit
18.53	18.20	18.82	16.18	17.66	19.12

* Single unit 7½ lb N per acre i.e., 270 lb of safflower cake (N = 2.6%) or 42 lb Nicifos 22/18 per acre
 † Double unit double the above quantities.

Plant spacings \times quality of manure \times units of manure

Plant spacings	Safflower cake		Safflower 22/18	
	Single unit	Double unit	Single unit	Double unit
12 inches	19 32	19 16	17 04	18 48
18 "	19 16	19 28	16 16	18 56

When closely spaced and without manure the crop gave a staple equal to some of those given by manures but the widely spaced crop (without manure) gave the lowest lint length. *Nicot* raised it appreciably. High staple less wider spacing on the Cambox effect of *Nicot* this is due to in variety and environment

1. Development of the plant — Field

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Total figures for all observations taken during and after the period of illumination are given in Table 21 A to C

The records of bud production, shedding total yield and vegetative growth for all the varieties are discussed below —

TOTAL BUD PRODUCTION

Malvi —Maximum bud production was obtained with illumination for both sowings in soil and with or without it for May sowings and cultures with other treatments, bud production was nearly 50 per cent less

Cambodia —Illumination doubled the production for July soil plants but did not much affect the production (high or low) of the other treatments

P A 289F —The total number of buds was low in general and illumination seemed to be unfavourable especially for the July soil culture

It appears that a favourable effect equivalent to that of increased photo synthetic activity can be produced without it when high nitrification can be maintained (whether by summer sowing or by use of sand) Malvi fares best with illumination and P A 289F worst with equal nitrogen supply

Shedding —With all the varieties the changes observed were similar to those of bud production but sometimes differed in degree

TABLE 21 — *Environment and the development of the cotton plant*

A MALVI 0

Description.	Summer sown (30.3.34)				Rain sown (4.7.34)			
	Soil		Sand		Soil		Sand	
	Un illumi- nated	Illumi- nated	Un illumi- nated	Illumi- nated	Un illumi- nated	Illumi- nated	Un illumi- nated	Illumi- nated
I. Up to 22nd November 1934								
1 Total bud production	78	144.3	102	102.3	80.5	103	78	8.5
2 Total shedding	50	103	107	106	31	77	46	56
3 Interval (days) between date of sowing and beginning of shedding	90	23	90	41	50	90	56	90
4 Period of shedding (in days)	90	102	90	110	90	56	90	56
5 Rate of shedding (per day) Item 2 by Item 4	0.62	0.65	1.2	0.75	0.34	1.4	0.44	1.0
6 Percentage of shedding on total bud production	71.8	71.3	70.4	65.3	38.5	46.7	59.0	65.9
7 Yield of <i>Kapas</i> in gms	12.6	0.3	15.3	1.1	1.8			
8 Number of mature boll	8	0.3	1-	1.3	1.5			
9 Number of green bolls present on 22.11.34	12	2	3	4	40	6	29	1
10 <i>Kapas</i> per boll in gms	1.6	1.0	1.3	0.83	1.2			
II. From 22nd November 1934 to 27th February 1935								
1 Yield of <i>Kapas</i> in gms	10.2	8.3	7.7	4.3	40.0	5.3	47.2	2.9
2 Number of mature bolls	12.7	10	7.3	9.3	40	4	22.5	2.5
3 <i>Kapas</i> per boll (gms)	1.3	0.83	1.05	0.46	1.15	1.32	2.09	1.16
III								
1 Total yield of <i>Kapas</i> (gms)	23.8	8.6	23.0	5.4	47.8	5.3	47.2	2.9
2 Total number of mature bolls	20.7	10.3	19.3	10.6	41.5	4	22.5	2.5
3 <i>Kapas</i> per boll (gms)	1.4	0.8	1.2	0.5	1.15	1.3	2.1	1.2
IV Vegetative growth								
1 Shoot length per bud in inches	2.6	1.9	2.1	1.8	3.0	2.1	2.6	2.2

TABLE 21—*Environment and the development of the cotton plant*

B CAMBODIA INDORE 1

Description	May sown (30.5.34)				July sown (4.7.34)			
	Soil		Sand		Soil		Sand	
	Un illu- minated	Illumi- nated	Un illu- minated	Illumi- nated	Un illu- minated	Illumi- nated	Un illu- minated	Illumi- nated
I <i>Up to 20th November 1934</i>								
1 Total bud production	100	128.3	136.7	108	77	106	76	63
2 Total shedding	91	100	109	93	68	84	53	57
3 Interval (in days) be- tween date of sowing and beginning of shed- ding	49	22	40	22	58	58	59	97
4 Period of shedding (in days)	142	100	112	100	90	69	99	53
5 Rate of shedding (per day) Item 2 by Item 4	0.64	0.66	0.76	0.58	0.75	0.93	0.64	0.95
6 Percentage of shedding on total bud produc- tion	86.7	81.8	79.0	86.1	88.7	66.7	76.3	90.3
7 Yield of <i>Kapas</i> in gms	11.6	0.7	20.9					
8 Number of mature bolls	4.7	0.3	7					
9 Number of green bolls present on 9-11.34	6	4	8	2	11	11	5	1
10 <i>Kapas</i> per boll in gms	2.5	2.3	2.7					
II <i>From 20th November 1934 to 24 February 1935</i>								
1 Yield of <i>Kapas</i> (gms)	12.2		9.0	0.6	40.0	19.3	21.5	3.9
2 Number of mature bolls	3.7		3.3	0.3	18	8	10	4.5
3 <i>Kapas</i> per boll (gms)	2.1		1.8	2.0	2.5	2.4	2.15	1.3
III								
1 Total yield of <i>Kapas</i> (gms)	23.8	0.7	30.4	0.6	43.6	19.3	21.5	3.9
2 Total number of mature bolls	11.4	0.3	13.0	0.3	18	8	10	4.5
3 <i>Kapas</i> per boll (gms)	2.2	2.3	2.3	2.0	2.5	2.4	2.15	1.3
IV <i>Leaf area growth</i>								
1 Blade length per leaf in inches	1.8	2.1	1.9	2.3	2.8	2.9	2.1	4.2

TABLE 21 — *Environment and the development of the cotton plant*

C. PUNJAB AMERICAN PVA 289F

Description	May-sown (20.5-34)				July-sown (4.7-34)			
	Soil		Sand		Soil		Sand	
	Un ill lumi nated.	Illumi nated	Un-ill lumi nated.	Illumi nated.	Un ill lumi nated	Illumi nated	Un ill lumi nated	Illumi nated
I. Up to 20th November 1934								
1 Total bud production	90	81	90	84	78	35	60.5	68
2 Total shedding	61	78	70	70	47	25	51	50
3 Interval (in days) be tween date of sowing and beginning of shed ding	49	49	49	49	53	90	69	90
4 Period of shedding (in days)	142	142	112	112	90	58	90	58
5 Rate of shedding (per day) Item 2 by Item 4	0.43	0.55	0.43	0.56	0.52	0.43	0.56	0.87
6 Percentage of shedding on total bud produc tion	63.5	95.3	77.8	91	60.2	71.4	77.8	82.4
7 Yield of <i>Kapas</i> in gms	17.8		15.4		3.6		1.6	
8 Number of mature bolls	7		8.7		2		0.5	
9 Number of green boll present on 29.11.34	11	1	2		10		8	
10 <i>Kapas</i> per boll in gm	2.5		1.8		1.8		3.0	
II. From 20th November 1934 to 24th February 1935								
1 Yield of <i>Kapas</i> (gms)	22.1		5.6		30.1		18.4	
2 Number of mature bolls	9		3.3		14.5		6.5	
3 <i>Kapas</i> per boll (gms.)	2.5		1.7		2.4		2.8	
III								
1 Total yield of <i>Kapas</i> (gms)	30.9		21.0		38.7		19.9	
2 Total number of mature bolls	16		12.0		16.5		7.0	
3 <i>Kapas</i> per boll (gms)	2.5		1.75		2.3		2.8	
IV Vegetative Growth								
1 Shoot length per bud in inches	2.1	2.7	1.7	3.3	2.8	4.9	1.2	2.5

Illumination hastened shedding in the May sown plants of Malvi and Cambodia but delayed it in all the July sowings except Cambodia in soil. The rate of shedding in July sowings was generally higher with illumination, differing in degree according to variety.

A

Total yield of Kapas—Yields were always depressed by illumination, P. A. 289F suffering most and July sown Cambodia the least

The stimulating influence of light did not extend beyond bud-production

Shoot length per bud—Shoot-length per bud was calculated by dividing the total length of all shoots as measured at the end of November by the total number of buds produced up to that time

Illumination depressed the shoot length per bud in Malvi but increased it for the American cottons

July sowings with the greatest reduction in shoot length per bud were those with illumination, but the effect was less marked in the American cottons. In the case of Malvi the effect was more marked in the case of the July sowing than in the case of the May sowing. This was due to the fact that the July sowing was more advanced in maturity at the end of November than the May sowing, and the effect of illumination was more marked in the case of the more advanced sowing.

(c) *Crop vigour and seed quality*—Yield differences in groundnuts (taken as a convenient indicator crop) due to localities were found associated with similar differences in oil contents. Crops from different places varying in yield and oil content showed different proportions of nuts apparently of different quality

TABLE 22—Yield and oil content of groundnuts grown in different localities

Variety—Akola 10

Locality	Yield in lb per acre	% in oil
Indore	1,566	49.5
Datia ..	3,050	49.6
Dhar ..	617	47.0
Dharatpur	483	47.2
Sitama ..	..	43.6

The nuts from one crop were sorted into three grades and shelled. The kernels from each grade showed distinct differences in appearance—colour, plumpness, size and brightness and there were very large differences in the oil contents

TABLE 23 — *Differences in oil content in different grades of groundnut*

Variety	Akola 10
Grade	% in oil
1st	44.5
2nd	37.2
3rd	30.3

Several replicated field trials were made in 1934 to test if such differences persisted in the succeeding crop and how differences in varietal habit and field fertility would react upon them.

Some of the results have now been examined.

TABLE 24 — *Yield vigour as influenced by seed quality.*

Mean yields in grams per plant

Grades	Rich field				Poor field			
	Akola 10	Gangapuri	Spanish peanuts	Total	Akola 10	Gangapuri	Spanish peanuts	Total
1st grade	46.6	51.7	20.3	118.6	23.8	11.5	15.7	51.0
2nd "	33.6	40.1	17.5	97.2	24.2	13.6	16.9	54.7
3rd "	34.0	45.0	10.4	89.4	22.0	10.5	16.1	48.6
Total	120.2	136.8	48.2	305.2	70.0	35.6	48.7	154.3

Significance (1) fields (2) varieties, (3) grades $P < 0.05$

Sig diff (1) 72 40, (2) 54 26, (3) 12 72

Other results are not significant

was an average of 1000 g per plant as groundnuts

(f) *Cropping power and soil characteristics*

(i) *Similarities of different soils.*

Profile samples were collected in the field in Dhar and Jaipur States and at Indore from Field No 31. Those were compared among themselves and with samples taken after harvest from Cambodia cotton plots at Indore with and without heated soil treatments (50 per cent in the top 6 inches). Determinations for hygroscopic moisture (50 per cent humidity) total nitrogen and base exchange capacity were made.

TABLE 25
Similarities of different soils

Description of soil		Hygroscopic moisture % on oven dry basis	Total nitrogen % on oven-dry basis (miligrams)	Base exchange capacity milli equivalents per 100 gms of air dry soil
Dhar soil	0" 12"	6.34	40.50	49.43
	12" 24"	7.57	34.60	50.20
	24" 36"	7.20	36.70	46.26
	36" 48"	6.43	28.90	47.87
	48" 60"	7.70	23.80	50.46
Jaipur soil	0" 6"	1.31	12.7	9.53
	6" 15"	1.29	10.4	7.74
	15" 24"	2.10	10.6	11.60
	24" 36"	2.30	10.7	14.39
Heated soil treatment	0" 6"	3.46	144.00	68.22
	6" 9"	4.57	87.50	74.14
	9" 15"	5.32	80.80	72.80
	15" 21"	4.86	78.39	88.94
	21" 24"	5.01	72.00	74.28
Indore Field 31	0" 12"	7.75	76.00	56.89
	12" 24"	7.10	38.10	52.47
	24" 36"	7.71	28.00	58.05
	36" 48"	6.64	22.50	54.10
	48" 60"	7.48	20.20	50.64
No treatment	0" 6"	4.75	81.00	82.16
	6" 9"	4.91	66.00	80.28
	9" 15"	6.07	88.00	81.14
	15" 18"	5.81	86.00	74.92
	18" 24"	5.59	59.00	74.70

Hygroscopic moistures were less in the upper than in the lower layers in Jaipur and Dhar soils and greatest in the upper layer of Field 31. Heated soil reduced it.

The total nitrogen content of the Jay, ar and Dhar soils was higher in the upper layer but at Indore in the second layer. Heated soil raised it in the upper layer. It also seems that the base exchange capacity is lowered up to 15 cm depth by the heated soil treatment perhaps the similar lower level in the Dhar profile is the result of similar processes as the soil type is the same.

The carbon content was less following heated soil and a Cambodia crop, it increased with manures and to a greater depth with heated soil.

The early and manure heated soil a nine inches may be pressed both by dune

The conductivity ratio between one-month and 24 hour water extract shows reduction to a greater depth in control plots with Cambodia than with Malvi. With each variety manure and heated soil separately increased it in upper layers but no further when together.

(ii) *Soil profile changes by cropping and treatments*

Profile soil samples from the experiment on the influence of open surface texture were sampled after harvest and examined (Table 20, A and D)

Hygroscoptic moisture was reduced in the upper layers by heated soil, manure and by the growth of the Cambodia variety.

The total yield of the Cambodia crop was greater in the unmanured control than the corresponding manured plots, but not so with Malvi

$t_f =$
 $p_s =$
 $t_f =$
 $h =$
 $p =$

The treatment of these soils is being continued by the changes in soil texture to the treatments selected and localised seems to be acting

(iii) *Soil moisture and crop growth*—In 1932 observations were taken to estimate the capacity for moisture retention of three typical fields at the Institute Field 31 (black soil, two to three feet deep) Field 22 (dark grey two to three feet deep liable to surface wash) and Field 40 (well-drained light grey and seven to fifteen feet deep). Samples of soil were taken on the 29th August from 0.2 inches depth and a month later from 0.12 inches in addition after rainless periods of two and three weeks respectively. Results are given below —

TABLE 27

A

Mean percentage moisture (on fresh basis)

Depths of sampling	29-8-32			29-9-32		
	Field 22	Field 31	Field 40	Field 22	Field 31	Field 40
0"-3"	29.15	28.85	25.10	22.95	25.18	22.72
9"-12"				22.02	22.67	20.07

Significances	P	Sig diff
Fields	<0.01	—
Dates	<0.01	—
Depths	<0.01	—
B Fields × dates	<0.01	1.90
C Fields × depths	<0.01	1.90

B

Dates of sampling	Field 22	Field 31	Field 40	Mean for dates
29-8-32	29.15	28.85	25.10	27.6
29-9-32	22.95	25.18	22.72	23.62
Mean for fields	26.05	27.02	23.89	

C

Depths of sampling	Field 22	Field 31	Field 40	Mean for depths
0"-3"	22.95	25.18	22.72	23.62
9"-12"	22.02	22.67	20.07	21.58

D

0-3 inches	6-9 inches	Significant difference
28.5	25.1	2.04

F

Area	Depths in inches				Mean for good v bad areas
	0-3	6-9	12-16	21-24	
Good	26.9	24.4	22.2	22.0	24.1
Bad	31.7	26.6	25.7	24.1	27.0
Mean for depths	29.3	25.5	23.9	23.5	

Significances —

P

Sig difference

Good v Bad area

<0.01

1.05

Depths of sampling

<0.01

2.20

Field 8 was in general moister than the others. The moisture was highest in the first 3 inches layer next came 6-9 inches and below one foot it remained at a constant level. Poor areas more moister at each depth in all the fields.

its fertility

Observations on crop growths in the same patches were taken from time to time the cotton crops were destroyed in both years by excessive rains. The following tables (29 and 30 A-D) include the observations on jowar for 1934 and on wheat for 1933.

TABLE 29

Jowar crop—good and bad areas 1934

	Good area	Bad area	P	Sig diff	Between	r
Grain in gms per plant	34.9	12.4	<0.05	19.49	Grain and Heights	.999
Heights in inches	76.2	53.1	<0.05	15.63	Grain and Kadbi	.999
Kadbi in gms per plant	72.3	20.2	<0.05	39.2	Heights and Kadbi	.999

TABLE 30

A

Mean yield in gms per plant Wheat—1933

Description	Grain		Bhusa	
	Early matured	Late matured	Early matured	Late matured.
Field 30				
Patch 1	27.5	19.6	32.4	25.7
Patch 2	20.8	12.8	25.9	16.4
Field 16				
Patch 1	22.4	23.6	34.3	36.0
Field 18				
Patch 1	62.4	14.1	92.0	18.5
Patch 2	34.0	16.0	54.5	27.5
Border	20.5	42.6	24.1	51.7

Significances —	P		Sig difference	
	Grain	Bhusa	Grain	Bhusa
Early vs Late maturity				
Fields	<0.05	<0.01	—	—
Patches	<0.05	<0.01	—	—
B (Early vs Late) × Fields	<0.05	—	—	—
C (Early vs Late) × Border vs Patches	<0.01	<0.01	1.42	—
D (Early vs Late) × Fields × Patches	<0.01	<0.01	1.27	1.67
	—	<0.05	—	3.05

B

Type of maturity	GRAIN				BHUSA			
	Field 30	Field 16	Field 18	Mean for early and late	Field 30	Field 16	Field 18	Mean for early and late.
Early	3.02	2.80	6.04	3.91	3.64	4.29	9.16	5.49
Late	2.03	2.95	1.89	2.68	2.63	4.50	2.89	3.66
Mean for Fields	2.52	2.88	3.95		3.14	4.39	6.01	..

C

Type of maturity	GRAIN		BHUSA	
	Border	Patches	Border	Patches
Early	2 56	4 18	3 01	5 98
Late	5 33	2 15	6 46	3 13
Mean for border and patch	3 94	3 16	4 73	4 55

D

Type of maturity	BHUSA			
	Field 30		Field 18	
	Patch 1	Patch 2	Patch 1	Patch 2
Early	4 05	3 24	11 50	6 81
Late	3 21	2 05	2 31	3 44

these late maturing plants inside the field yielded less than early plants around them

Comparing the two groups of late plants the lateness of the moist patch plants seems to be due to their weakened vigour, that of the border plants is not due to weakening but presumably to their ability to tap more water in the absence of competition, and in spite of their prosperous appearance their yield is only equal to that of the early plants inside the field

It appears that vigour and health of crops are determined by the soil capacity for free water movement in wet weather in the first foot and moisture retention in dry weather. This is why texture improvement by humus supply shows superiority over other methods

—The ability of Badnawar (Dhar)

The usual mechanical and chemical analyses were made, and hygroscopic moistures, maximum moisture—holding capacity, and available potash and phosphates were deter-

Ratios of available nutrients in the first zone.

Soils	N to av P ₂ O ₅	N to av K ₂ O	av P ₂ O ₅ to av K ₂ O	Available		N to In- org. av. P ₂ O ₅	N to org P ₂ O ₅
				Inorg P ₂ O ₅ to K ₂ O	Org P ₂ O ₅ to K ₂ O		
Jampur	1.73	0.52	0.30	0.05	0.25	11.00	2.06
Badnawar	1.01	0.96	0.97	0.21	0.76	4.61	1.29
Indore	1.08	1.25	1.16	0.28	0.88	4.56	1.42

The proportion of coarser fraction was greater and that of clay less in the top zone than below in Jaipur and Badnawar soils and *vice versa* in Indore soils.

Carbonates gradually increased with depth in Jaspur. In Badnawar soil the percentage was high in the top zone and low in the Indore soil, in each it then alternated in successive lower layers.

Similarly the available proportion of total potash was highest in Jaipur and lowest in Indore soils.

In Jaipur and Badnawar soils much more potash was available in proportion to nitrogen than in Indore soils. In the same way, in proportion to phosphates, both organic and inorganic, the largest amount of potash was available in Jaipur soils and least in Indore soils.

These differences seem to be interesting in the light of the results discussed in the cotton wilt section of this report (9) (a) and those on nutrition (9) (b), (c) and (d).

10 CROPS OTHER THAN COTTON.

encouraging

(b) *Botanical*—The developmental study of bread and durum wheats was carried out in the *rabi* season, and the data await analysis. It is not expected that any further experimental work will be required.

mined the latter in inorganic and organic forms Some of the outstanding differences are noted below —

TABLE 31

Differences in profile characters

A MECHANICAL

Percentage of	Jaipur profile		Badnawar profile		Indore profile	
	1st zone 0-6"	2nd zone 6"-15"	1st zone 0-12"	2nd zone 12"-24"	Field 31	
					1st zone 0-12"	2nd zone 12"-24"
Coarse sand	2 73	1 92	0 80	0 68	0 24	0 87
Clay	6 15	7 35	16 35	29 80	41 60	35 95
Co ₂	0 02	0 02	2 53	1 58	0 44	1 45

B CHEMICAL

Available in the first zone

Soils	Per cent Total N	Per cent available P ₂ O ₅	Per cent available P ₂ O ₅ on total	Per cent on available P ₂ O ₅		Ratio org to Inorganic P ₂ O ₅
				Inorganic P ₂ O ₅	Organic P ₂ O ₅	
Jaipur	0 013	0 0075	19 95	16 00	84 00	5 25
Badnawar	0 041	0 0407	28 87	21 87	78 13	3 59
Indore F 31	0 036	0 0332	47 69	23 74	76 26	3 21

C

Available potash in the first zone

Soils	Per cent available K ₂ O	Per cent available K ₂ O on total K ₂ O
Jaipur	0 0248	22 15
Badnawar	0 0419	7 26
Indore	0 0287	5 51

D

Ratios of available nutrients in the first zone

Soils	N to av P ₂ O ₅	N to av K ₂ O	av P ₂ O ₅ to av H ₂ O	Available		N to In org av P ₂ O ₅	N to org P ₂ O ₅
				Inorg P ₂ O ₅ to K ₂ O	Org P ₂ O ₅ to K ₂ O		
Jaipur	1 73	0 52	0 30	0 05	0 25	11 06	2 06
Badnawar	1 01	0 96	0 97	0 21	0 76	4 61	1 29
Indore	1 08	1 25	1 16	0 28	0 88	4 56	1 42

The proportion of coarser fraction was greater and that of clay less in the top zone than below in Jaipur and Badnawar soils and *vice versa* in Indore soils

Carbonates gradually increased with depth in Jaipur. In Badnawar soil the percentage was high in the top zone and low in the Indore soil. In each it then alternated in successive lower layers

Similarly the available proportion of total potash was highest in Jaipur and lowest in Indore soils

In Jaipur and Badnawar soils much more potash was available in proportion to nitrogen than in Indore soils. In the same way in proportion to phosphates both organic and inorganic the largest amount of potash was available in Jaipur soils and least in Indore soils

These differences seem to be interesting in the light of the results discussed in the cotton wilt section of this report (9) (a) and those on nutrition (9) (b) (c) and (d)

10 CROPS OTHER THAN COTTON

(a) *Plant Breeding* — Study of the crops of Central India and Rajputana immediately

encouraging

(b) *Botanical* — The developmental study of bread and durum wheats was carried out in the *rabi* season and the data await analysis. It is not expected that any further experimental work will be required

(c) *Cytological* —The development of more profitable lines of work has made necessary the postponement of work on the chromosome number of gram. Chromosome numbers of Indian and Moroccan linseeds were determined in root tip material and were found to be the same in both types.

(d) *Fodder Plants* —A list of the natural fodder plants occurring in the neighbourhood of the Institute has been compiled, and is available for the assistance of those engaged in agronomic work on fodder improvement.

(e) *Tobacco* —The ease and practicability of drying a crop on a large scale has now been proved. The hand slicer designed at Indore has proved very satisfactory.

(f) *Maize* —The ease and practicability of drying a crop on a large scale has now been proved. The hand slicer designed at Indore has proved very satisfactory.

(g) *Sugar-beet* —Closer spacing increases yields. The crop responds well to artificial manures. The ease and practicability of drying a crop on a large scale has now been proved. The hand slicer designed at Indore has proved very satisfactory.

(h) *Sugarcane* —Closer spacing increases yields. The crop responds well to artificial manures. The ease and practicability of drying a crop on a large scale has now been proved. The hand slicer designed at Indore has proved very satisfactory.

(i) *Lucerne* —It has been found possible to reduce the cost of seed and irrigation by drill sowing and implement culture. Good viable seed has now been produced locally.

(j) *Preliminary small growth tests on various crops* —Kudzu vine, holiness, tery, beans and jute. Tefi grass seed appear again. Variation in Mal.

11. STATISTICS AND FIELD-TRIAL TECHNIQUE

Four papers on the technique of field trials.

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In the season under review the randomised block technique was successfully applied to the problem of testing progeny rows in plant breeding work. Problems arising out

of the necessity of using very small plots, the very different amounts of seed available in different progenies, and the effect of dispensing with plot margins are being studied, and the first results will be ready for publication shortly

12 MISCELLANEOUS

(a) *Agronomic survey*—A great deal of information has been collected about the present state of the

(b) *Soil erosion*—Experience has shown that the system on which the Institute

is being tried extensively to adapt it to local conditions. A number of plants have been tested for this purpose

(c) *Eradication of kans and other weeds*—It was noticed in the malabar region that compost that covered the soil showed the effect of killing the weeds and controlling the growth of

(d) *Dry farming and humus supply in arid regions*—Following up the results of qualitative tests on the Jaipur State Farm replicated experiments are now laid down to find the best way of retaining the deficient rainfall so as to make possible cotton and other such crops by ensuring the necessary water-balance in the crop up to maturity

(e) *The use of heated soil*—The effect of heated soil on the factory growth of plants in local black soils has been studied. The efficacy on American crops supplied in combination with phosphatic compost

A simple technique has been devised to make heated soil cheaply in the field with the help of available crop residues

(f) *Poisoned bait for white ants, etc*—The composition of the baits has been improved to make them more attractive and efficacious. Field trials are in progress to determine utility and cost.

13 COMPOST MANUFACTURE

use of cattle dung and composting is being introduced with much success in the Holkar State.

The method of charring and crushing bones for use as manure either alone or in the form of compost has been systematized

It has been found possible to reduce by 25% the amount of fuel required for the charring of bones. The method of charring and crushing bones for use as manure either alone or in the form of compost has been systematized

addition of such material does not seem to affect the quality of the compost. The extra expenditure and manipulation involved appear to be of doubtful utility in practice because in any case such larvae are destroyed after the first turn if the process is properly carried out.

Widespread interest has been displayed in the process by Public Health Officers, Municipalities and others both in India and abroad, enquiries are constantly being received, over 500 copies of the Bulletin (No. 1) describing it have been sold and the first edition of 1,500 copies is now exhausted.

(c) *Use of compost*—A method has been devised and is being tried on a field scale to raise the fertility of *barani* (mal) lands more nearly to the level of that of garden lands (*adhar*) by applying manure or compost uniformly in the deeper layers in addition to surface dressings.

14 PUBLICATIONS.

The following papers have been published or submitted for publication.

'The health and vigour of the cotton plant in relation to its environment'—Report 2nd Conf. on Cotton Growing Problems, July 1934, Empire Cotton Growing Corporation.

"Silage making in Mud-walled Towers"—G. C. Tambe and Y. D. Wad; Empire Cotton Growing Review, XI, 1934, No. 4.

"Humus manufacture from cane trash"—G. C. Tambe and Yeshwant D. Wad; International Sugar Journal, XXXVII, 1935, pp. 260-263.

"Some observations on the Inheritance of Form and Size in Asiatic Cottons", by J. B. Hutchinson (To be read at the VIth International Botanical Congress, Amsterdam, September 1935).

"The Classification of *Gossypium* with special reference to the cottons of the Old World," by J. B. Hutchinson and R. L. M. Ghose.

'Studies in the Technique of Field Experiments,' by J. B. Hutchinson and V. G. Panse.

(I) 'Size, shape and arrangement of Plots in Cotton Trials'.

(II) 'Sampling for Staple Length Determination in Cotton Trials, with a Note on the Standard Error of Estimates of Ginning Percentage'.

(III) "An Application of the Method of Co-variance to Selection for Disease Resistance in Cotton."

(IV) "A Study of Margin Effect in Variety Trials with Cotton and Wheat."

"A Note on the Inheritance of Sterility in Cotton" by J. B. Hutchinson and P. D. Gadkar.

"Nitrogen Balance in Black Cotton Soils in the Malwa Plateau II" by Y. D. Wad and R. K. Aurangabadkar.

Institute leaflets issued or revised during the year —

No. 5—"Improved method of gur manufacture" (English and Hindi, illustrated).

No. 7—"Lucerne Cultivation" (English and Hindi).

No. 8—"Cultivation of cotton in Gang Canal Colony" (Urdu).

No. 10—"The Preparation of Bone-char Manure" (Eng.).

No. 2—"The making of Rain watered Compost Manure from Farm Wastes" (English and Hindi). Revised June 1935, with one illustration.

The following papers were read at the 1935 Session of the Indian Science Congress Calcutta —

Influences dominating cotton yields in Monsoon Areas—I by Kubersingh and Y D Wad

Nitrogen Balance in Black Cotton Soils in the Malwa Plateau—III by Y D Wad and R A Aurangabadkar

Provision of Succulent Fodder for Work cattle in Central India by G C Tambe Chironjula Nagar and T Krishnamoorthy

Agronomic Adjustments of the cotton crop in Gang Canal Colony Bikaner State by Shamsheer Singh and Y D Wad

THE WORKING OF THE FARM

15 EXPERIMENTAL WORK

(a) *Nature of the season* —

the sowing started on the 26th
The fall up to the end of July
The next month was equally w
In September 16 inches of rain
rain November 5th recorded
four days The temperatures recorded were as follows —

1935 January	12	50° F
	13	40° F
	14	34° F
	15	29° F
	16	29 5° F
	17	31 5° F
	18	31 5° F
	19	37 5° F

(b) *Field Trials* —The following experiments were conducted on the Farm —

Humus supply —(1) Incorporation of organic matter in the soil (2) Effect on wheat of green manuring with sann at different stages (3) Improvement of water logged soils for rabi crops

Soil improvement —(1) Improvement by the application of lightly heated soil (2) Control of soil erosion by contour line sowing and the use of arrester crops

Water cultivation of crops (1932 1933 1934)
The importance of weeding and interculture
efficiency of different implements of inter

Rotation —(1) Rotation of crops (1932 1933 1934 1935)

Associated growth of crops —(1) Association of cotton with soya beans and cowpeas (2) Spacing test on tur and its association with cowpeas

Weed eradication —(1) Eradication of kanks by chemical means

Treatment of seed —(1) Trial of Agrosan G against Jowar smut

Multiplication of seed —(1) Soya beans of 32 varieties in *Harif* (2) Soya beans of 6 varieties in rabi (3) Paddy varieties 7 (followed by wheat)

Paddy variety	Date of harvest	Paddy yield mds	Wheat yield mds
Shahjanpur 23	2 10 34	12 0	8 68
Shahjanpur 1		15 7	9 85
		9 3	9 00
		10 6	12 40
Johna	12 5	10 30	
Datu	15 10 34	4 3	6 70
		20 3	6 70
		16 0	4 60
		15 4	4 15
		11 4	4 27
Bhatta Gurmatia	29 10 34	16 3	4 60
		14 4	4 50
		14 9	4 66
Mushkan	8 10 34	12 6	10 00
Pahan	10 10 34	17 2	5 40
		9 0	5 45
		4 2	7 60

Paddy not irrigated

Wheat—2 irrigations

Small growths—(1) Oats for fodder (2) Bagilla fodder*Sugarcane*—(1) Multiplication of promising acclimatised Coimbatore varieties and also Sorghum crosses (2) Varietal trial on S48 Co210 Co213 Co281 and Co290 (3) Agronomy trial on S 48*Lucerne*—(1) Inoculation of seed (2) Manurial trials (3) Agronomy trial*Sugarbeets*—(1) Trials in different soils under dry and irrigated conditions*Pasture Studies*—(1) Response of grasses to various manures*Compost*—(1) Preparation of phosphatic compost (2) Composting cane trash (3) Composting cowdung alone16 *Crops and Yields*

	Yields in mds Max	Per acre Min
<i>Dry crops</i>		
Cotton		
Jowar	3 6	1 4
Tur	9 7	0 4
	5 4	0 3
Groundnuts—		
Gangapuri		
Akola 10	13 1	1 1
Wheat (Malvi)	5 5	0 9
Gram (Malvi)	9 5	2 0
Linseed	9 0	1 0
	4 5	3 7

			Yields in mds Max	Per acre Min
<i>Irrigated crops —</i>				
Paddy (mushlan)			29 0 mds	12 6 Plot size 50 × 20
Sugarcane	Co210		534 6	
	Co217		464 7	
	Co281		445 0	
	Co290		710 0	
	S 48		318 7	
Lucerne agronomical				
Year	Season	Cuttings	Plot yield in lb	Total per acre in lb
1932 3	Winter	2	5 480	
	Summer	6	27 876	
	Monsoon	3	7 180	
				45 040
1933-4	Winter	4	10 133	
	Summer	5	10 053	
	Monsoon	2	3 443	
				26 250
Lucerne manual				
1932 3	Winter	1	5 307	
	Summer	5	23 513	
	Monsoon	3	4 129	
				47 070
1933 4	Winter	4	9 189	
	Summer	5	13 858	
	Monsoon	2	4 583	
				39 470
Peas (green pods)		8 8 mds		
seed		2 6		

The calculated gross returns from the Farm amount to Rs 5 000 The wet weather coupled with the cold wave reduced this figure seriously

460 cartloads of compost were prepared from the available farm wastes and 32 cart loads of night soil compost from the residential block (population about 100)

1 145 mds of silage from grass and legumes were made This provided an excellent succulent fodder for the hot weather

(b) *Workshop* — This section continued to render useful service in the same directions as reported last year The sugarbeet slicer devised in the previous year was further improved upon

A portion of the fence line was repaired and the wood work of the buildings repainted

(c) *Irrigation* — A persian wheel was installed in place of the Boulton Elevator worked by engine power for purposes of demonstration and economy

Lectures and demonstrations were given by the Extension Officer in district tours in eight States. To large village audiences he explained the advantages of growing good crop varieties, of increasing their manure supply by making rain-watered compost from

at the disposal of the Darbars and were freely used

Assistance was also given by the Extension Officer in organising demonstrations at twelve agricultural shows and cattle fairs in eight States. Illustrative exhibits were provided, lectures given and cinematograph films shown on agricultural and rural uplift subjects accompanied by running commentaries

At a public meeting in Jaipur presided over by Lt-Col Sir H Beauchamp St. John, K.C.I.E., C.B.E., Vice-President, Council of State, the Extension Officer explained the work and objects of the Institute to a large audience of landowners, State officials and cultivators, cinematograph films were also shown

Acknowledgment is due to the Indian Central Cotton Committee and the Central Publicity Officer, Railway Board, for the free loan of films

F K JACKSON,

Director.

STAFF AND RESEARCH STUDENTS OF THE INSTITUTE OF PLANT INDUSTRY AS ON JUNE 30TH 1935

Administrative and Clerical —

Director and Agricultural Adviser
to States in Central India and
Rajputana

F Keith Jackson N D A (Hons), Dip Agr
(Cantab)

Personal Assistant

A N Srivastava M Sc

Head Clerk and Accountant

G M Nadkarni

2nd Clerk

Mohiuddin Khan

3rd Clerk

S M Ajmi

4th Clerk

S M Azim

5th Clerk

V R Shirsath

Artist

S J Oncar

Librarian

Bashir Husain Khan

Botanical —

Geneticist and Botanist

J B Hutchinson M A (Cantab)

Senior Botanical Assistant

R L M Ghose M Sc

Plant Breeding Assistant

Kuber Singh B Ag

Botanical Assistant

Vacant

Statistical Assistant

V G Panse B Sc

Genetical Assistant

Bholanath M Sc

Computer

S A Khargonkar

Fieldman

E L Rajanna

Research Student

G K Govande M Sc *

M A Ansari M Sc *

P D Gadkari M Sc *

Maya Prakash Singh M Sc †

B S Kochrekar B Ag †

Chemistry and Agronomy —

Chemist and Agronomist

Y D Wad M A M Sc A I I Sc

Laboratory Assistant

L N Desai B Sc

G T Shahane

(Temporary)

V V Dravid B Sc

()

S J Ghose

()

G K Sant B Sc

()

P M Kulkarni B Sc

()

B Goswami B Sc

()

R S Gharpure B Sc

Research Assistant

()

I Madhusadan Rao M A

()

Chironjilal Nagar B Sc

Research Student

()

V N Bhargave B Sc

R K Aurangabadkar M Sc *

S C Chakravarty M Sc *

K N Ambegaonkar M Sc *

S B Mogre M Sc *

Propaganda and Extension Work —

Extension Officer

M L Saksena L Ag

* Institute of Plant Industry Studentship

† Voluntary research worker

Farm Executive —

Farm Superintendent	G C Tambe B Ag
Assistant Farm Superintendent	S C Talesara B Ag
Junior Farm Assistant	G G Phadke L Ag (on deputation to Bharatpur State as Agricultural Officer)
	^ S Apte B Ag (Actg)
Fieldman	K M Simlote B Ag
	Nihalsingh
	^ R Sathe
Storekeeper	G M Nigudkar
	^ S Dravid

INSTITUTE OF PLANT INDUSTRY INDORE

Research Programme for 1935-36

A GENETICS AND BOTANY SECTION

COTTON

(1) *Botanical Survey*—Owing to delay in despatch of the specimens promised by the Botanical Survey of India the contemplated paper on the classification of Asiatic cotton will probably have to be completed in 1935-36

(2) *Genetics*—Study of inheritance of major factors in Asiatic and Indian American cottons

Study of cases of abnormal inheritance of major factors

Study of the inheritance of quantitative characters

Study of interspecific hybrids with special reference to the bearing of heterosis on plant breeding procedure

Study of the rate of mutation in mutable strains

(3) *Cytology*—Study of sterile types derived from an interspecific hybrid (G arboreum \times G herbaceum)

Study of chromosome behaviour in F₁ F₂ and backcrosses of G africanum \times cultivated Asiatic cottons

(4) *Physiology*—Study of cotton hair characteristics

Development of tests for lint quality suitable for the needs of the plant breeder

(5) *Selection and Breeding*—Propagation and distribution of Malvi 9 Study of variance in Malvi 1 Malvi 9 and the cross between them and re selection for further propagation according to the results obtained

Study of and re selection in progeny rows of 1933 selections

Study of problems of transference of herbaceous quality to Malvi type

Study of Cambodia selections grown at Badnawar

Study of selections in Nimar *desi* made in 1933 and grown in 1934 at Dhamnod

(6) *Variety Trials*—Variety trials will be laid down at the Institute and in the territory of member States as found necessary in the light of results obtained from current trials

(7) *Statistics*—The investigations in progress into statistical problems involved in field testing strain testing where very small quantities of seed are available and in the examination of segregating progenies will be continued

OTHER CROPS

Work on other crops will be largely confined to the selection and purification of desirable high yielding strains for the main areas served by the Institute and fundamental research in the restricted to cotton Exceptions from this rule will occur from time to time to be done test

- (1) *Botanical* —Comparative developmental study of durum and bread wheats
- (2) *Genetics* —Study of inheritance of certain characters in local durum wheats
- (3) *Selection and Breeding* —Selection and breeding work will be continued on the following crops —

Kharif —

Jowar
Bajra
Tur
Tilli
Niger
Groundnut

Rabi —

Wheat
Barley
Gram
Linseed
Kesari
Safflower

A part at least of the breeding material in these crops will be grown on the farms of member States

- (4) *Variety Trials* —Variety trials on all crops of interest to member States will be laid down in the light of information gained from the current season's experiments
- (5) *Lathyrism* —Work on Kesari has been resumed and in connection with it the botanical and agricultural problems involved in the growth of the associated weeds responsible for lathyrism will be studied

B—CHEMISTRY AND AGRONOMY SECTION

Continuation of the present work

Reviewing of accumulated data and writing up the summarised results

The main feature of the future programme will be considerable increase in laboratory and cultural work side by side with accurate field observations in addition to extensive field experiments of a complex nature In many cases suitable technique is not available and will have to be evolved

The material collected will be further analysed and summarised

Bio-chemical studies on 'wilt'—The information so far collected will be summarised and further studies will be started to elucidate changes both in the plant and soil which seem to favour the incidence and progress of the disease

The information so far collected will be summarised and further studies will be started to elucidate changes both in the plant and soil which seem to favour the incidence and progress of the disease

Crop vigour and seed composition—This work is to be continued. Studies similar to those on groundnut will be made on linseed and wheat for comparison with those on cotton. The work projected in the 1934-35 programme on *Reaction changes in sap* and on *Ripening of cotton bolls* has been suspended, in favour of soil fertility studies which seem likely to give profitable results earlier.

Other factors—The preliminary results will be reviewed for publication and further work planned mainly with a view to get an estimate under controlled conditions of the disturbances in vigour and health of *desi* and American cottons commonly observed in the field. A study will also be made if possible, of the likely share, in determining the health and vigour of the cotton plant of disturbances in the respiration of roots which appear to take place in the field.

A beginning will be made to study the relative influence of the course of nutrition

potcultures and field experiments

Nitrogen-balance in the field—Further aspects of this problem will be taken in hand.

General soil studies—Results will be summed up for publication

(1) Three more soil types in their important phases will be taken up. The soils in hand will be examined further

(2) Soil samples from field experiments will be examined

(3) Water regime of the black soils of Malwa during rains and the arid soils of Bikaner throughout the year will be studied in a preliminary way

(4) The movement and changes in the solubles will be similarly studied at both places, with special stress on important environmental phases usually prevailing in the local cotton fields during the season

(5) The study of the alterations by surface treatment of the soil profile as well as the influence of the growing crop upon it will be pushed further

(6) The changes and fluctuations in soil properties at different periods of the crop season will be estimated item by item

Soil studies in relation to plant growth—(1) Attention will be concentrated on estimating the influence, on the final yield of the local cotton crop, of the several checks during wet spells and the extent to which they may be affected by soil conditions

(2) The work already in hand upon plant growth in rich and poor patches in the same field is to be continued with a few alterations

a profitable and convenient system for the summer

Water-logged soils and erosion—A few fields will be put under the control methods found promising in order to estimate the rate and extent of probable improvement in fertility.

therefore 191 336 acres as against 163 358 acres of last year. The Gadag Sale Society also distributed 122 497 lb of *Gadag No 1* seed enough for 12 250 acres outside its own area of operation. The total area under *Gadag No. 1*, therefore, came to about 102 500 acres.

seed enough for 43 134 acres has been stocked for the coming season.

Both *Jayawant* and *Gadag No 1* continued to be appreciated by the buyers who gave on an average Rs 4 more per *Naga* of seed-cotton (1,344 lbs) for *Jayawant* and Rs 12 per *Naga* for *Gadag No 1* in auction sales.

148 000 acres in the preceding year. It has increased considerably during the current year 1935-36.

Three main classes of cotton—Three main classes of cotton have been found to be successful in Sind viz (a) Sind *deshi* (b) Sind American (c) Imported Egyptian.

Among each of these three main classes the Department of Agriculture in Sind has by botanical selection evolved improved strains which on account of better yield, high ginning outturn or superior quality are suitable for extension in general cultivation in the different cotton growing tracts of the Barrage areas.

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Sind American 4F-98—It has a staple length of $\frac{7}{8}$ " to 15/16" and spins 34 s. It has a ginning outturn of 33.34 per cent and gives a high yield. This improved strain has been found to be the most suitable type for cultivation in the new cotton growing tracts being established on the Right Bank of the Indus.

Sind American 289 F1—This is a new strain of cotton which has been evolved by the Department of Agriculture in Sind. It has a staple length of $\frac{7}{8}$ " to 15/16" and spins 34 s. It has a ginning outturn of 33.34 per cent and gives a high yield. This improved strain has been found to be the most suitable type for cultivation in the new cotton growing tracts being established on the Right Bank of the Indus.

The high premiums in price obtained for Sind American cottons during the season 1934-35 have resulted in considerable increase of area under these cottons.

Imported Egyptian and Sea Island cottons—Selected strains of these cottons acclimatised in Sind have been produced by the Sind Agricultural Department viz (1) *Sea Island 24* (2) *Boss III 16* (Egyptian) have a staple length of $\frac{1}{4}$ " to $\frac{1}{2}$ " and are suitable for spinning 60-50 s and (3) *Ashmouni 37* (Egyptian) has a staple length of $\frac{1}{4}$ " and is suitable

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per acre in comparison with about 12 *mannas* obtained with Sind American on good lands. The staple of these fine quality cottons is fine and strong. They require better cultivation than Sind American or *deshi* cotton and should be grown on the best portion of the area to be put under cotton. During the year 1934-35 about 150 acres only were grown to these cottons but during the current season 1935-36 the area has increased to 2,400 acres.

Sind Deshi cotton — This cotton has a special market of its own on account of its bright colour and rough feel being suitable for mixing with wool. It is very hardy and resists variations of soil, climate and season. It is capable of giving high yields and can be sown

THE ECONOMIC SIDE — The economic side of the question which is of primary importance to the grower depends largely upon the prices prevailing for the various types of cotton. During 1934-35 these cottons were sold in large quantities at the following rates —

Variety	Price of cotton lint	
	Per maund of 82 lb	Per <i>khandy</i> of 784 lb
SIND AMERICAN —	Rs a p	Rs a p.
4F 93	25 0 0	238 4 0
289F 1	27 0 0	257 5 0
SIND EGYPTIAN AND SEA ISLAND —		
<i>Sea Island 2 4</i>	44 7 10	424 0 0
<i>Boss III 16</i>	44 7 10	424 0 0
<i>Ashmouni 37</i>	37 10 8	359 0 0
<i>Sind Deshi 27 W N</i>	15 8 0	147 11 5

The price of Broach cotton was Rs 229 when Sind Egyptian and *Sea Island* cottons were sold at the above rates.

The seed extension scheme is based on

therefore 191 336 acres as against 163 358 acres of last year. The Gadag Sale Society also distributed 122 497 lb of *Gadag No 1* seed enough for 12 200 acres outside its own area of operation. The total area under *Gadag No. 1*, therefore came to about 102 530 acres

to previous year's crop by very heavy floods in the Krishna river. The seed enough for 43 134 acres has been stocked for the coming season

Both *Jayawant* and *Gadag No 1* continued to be appreciated by the buyers who gave on an average Rs 4 more per *Naga* of seed cotton (1,344 lbs) for *Jayawant* and Rs. 12 per *Naga* for *Gadag No 1* in auction sales

Sind American cotton is the annual

1935 36

Three main classes of cotton—Three main classes of cotton have been found to be successful in Sind viz (a) *Sind desh*; (b) *Sind American* (c) *Imported Egyptian*

Among each of these three main classes of cotton, the *Sind* has by botanical selection a different ginning outturn and different cotton

Sind American cotton—The total area of 202 800 acres out of the

the original material these are —

Sind Amer — It has a ginning outturn found to be the established on

Sind Amer — It is the best of the group given to it

The high premiums in price obtained for *Sind American* cottons during the season 1934 35 have resulted in considerable increase of area under these cottons

Imported Egyptian and Sea Island cottons—Selected strains of these cottons are cultivated in Sind have been produced by the Sind Agricultural Department viz. (1) *Sea Island 24* (2) *Boss III 18* (Egyptian) have a staple length of $1\frac{1}{2}$ " to $1\frac{3}{4}$ " and are suitable for spinning 60-50 s and (3) *Ashmouni 37* (Egyptian) has a staple length of $1\frac{1}{4}$ " and is suitable

74
ac
ce
st
fa
Handy of 500 lb in the market on the date of sale

was 1,330 ac

The area under these strains covered by natural spread is estimated to be 117,748 acres. It is proposed gradually to replace this strain by another promising strain Koilpatti No 1 (*Karingannu*). Seed of the new strain for growing nearly 500 acres in the coming season has been obtained.

II *Northerns and Westerns tract*—A *Northerns*—On account of the very limited area where it can be grown profitably no good farms are available and the total

good season, an average yield of 500 to 600 lb *nagas* per acre was obtained, as against about 70 lb per acre in the previous year. The premium paid by Messrs Binny and Co was Rs 10 to Rs 15 per *khandy* (500 lb).

B *Westerns*—The area of seed farms maintained and sown to *H 1* was 3 538 acres as compared with 2,895 acres in the previous year 291,233 lb of *H 1* seed were distributed in 1934-35 as compared with 223,300 lb in the previous year

per acre as against 150 lb in the previous year

By means of co-operative marketing, 600 bales of *H I* lint was sold by *ryois* assisted by this Department and the premium realised ranged from Rs 3 8 to Rs 5 per bale of 400 lb. The fall in the premium is due to the poor quality of lint caused by low rainfall.

Laboratory Bombay in the previous year. Consequently these two strains are being tried out in the districts and multiplied. The report of the Technological Laboratory is repeated for information.

Cotton.	Staple length inch	Highest standard warp counts	Value above or below contract rate for Broach Extra Superfine @ Rs 182
C/19	11"	10	Rs 20 off
C/19 x W5	11/16"	13	Rs 15 off
L11 x R6	11"	20	Rs 10 off

Fig. 1. C. 19. In the West Central Circle the crop of 1927 was 100,000 bales.

Distribution of the seed of three improved Wagale strains was made in Thayetmyo, Minbu and Pakokku Districts. It is reported that the yields in all the places were satisfactory.

Rajppla State—The Rajppla State has continued its policy of maintaining the 1027 A L F variety throughout the State. No other variety is allowed for annual distribution of selected seed by the Cotton Transport Act which is the State for purposes of sowing. (2) by the control of ginning and pressing factories for the prohibition and prevention of admixture of short staple varieties with the pure 1027 A L F crop of the State.

As the cotton crop of the Surat District wherefrom the supply of the seed of 1027

of 1027 A L F variety
the short staple
of some forty to
Districts to sell
it has achieved
demand for it that
comparatively good

prices

Besides this measure has stimulated the growth of meetings for the sale of the cotton crop to the highest customer at various agricultural centres in the State, and this has resulted in cultivating a spirit of combination in the cultivators to dispose of their agricultural produce at the best prices available.

Rajppla cotton (known by the term Jagadia cotton in the market) is now recognised. A notable feature of the crop

As no pedigree seed of 1027 *A L F* was available from the Bombay Department, seed separately ginned under Departmental supervision, from the registered growers was distributed to 435 registered seed growers in 4 groups and this is expected to cover about 5,000 acres

(2) *Baroda District* — The seed of *Wagad No 8* pure cotton was supplied to the cultivators to cover an area of about 2,100 lb of *Wagad No 8* pure cotton seed was supplied to the cultivators but severe frost has interfered in getting any results

(3) *Mehsana District* — Attempts are being made to introduce *Wagad No 8* in place of local *Wagad No 8* pure cotton seed was supplied to the cultivators covering about 3,500 acres by the Amreli Pedhi and Cotton Seed Supply Association

(4) *Amreli District* — *Dhruva No 1* is being recommended for this part and 57,930 lb of seed cotton was supplied to the cultivators covering about 3,500 acres by the Amreli Pedhi and Cotton Seed Supply Association

HYDERABAD STATE — 1 *Gaorani Tract* — Distribution of *Gaorani* seed in the protected area was continued 1,169,338 lb of seed for an area of about 73,000 acres was purchased by the Agricultural Department and distributed on *Tacavi* loan system to cultivators in the Nanded district

A beginning has been made with multiplication of seed of two recently evolved superior strains of *Gaorani*, for distribution in the next year

2 *Aurangabad District* — Distribution of *Banilla* seed was continued, with a view to replace the inferior mixture now grown in the district 143,040 lb of seed sufficient for about 9,000 acres was distributed by the Agricultural Department on *Tacavi* system

3 *Parbhani District* — Distribution of seed of *Verum 262* was continued, with the object of replacing the present inferior variety 18,296 lb of seed sufficient for about 1,550 acres was distributed by the Agricultural Department

4 *Raichur District* — Distribution of seed of improved varieties was continued, with a view to replace the local inferior type of *Kumbia* and the mixed Dharwar-American seed of *Jayant* variety amounting to 295,608 lb sufficient for about 29,551 acres and seed of *Upland Gadag No 1* amounting to 31,710 lb for about 3,471 acres was distributed this year

BALANCE SHEET AS AT 31st MARCH 1935—contd

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Receipts	Rs a p	Expenditure	Rs a p	Rs a p
Brought forward	1 13 54 607 4 9	E Statistical Return A— 1 Studies of village consumption of cotton 2 Forecast Improvement Scheme	21 2786 11 10	
		II Technological Return A— 1 Technological Laboratory— A Capital Expenditure— 1 Land and Buildings 2 Machinery 3 Freight 4 Apparatus and Equipment 5 Machinery Workshop B Working Expenses 2 Provincial	382 741 10 3 56 336 1 8 7 502 2 8 41 538 3 7 5 780 8 3 15 10 538 5 9 63 397 3 3	
		III Research Studentships		20 97 861 3 5 2 39 822 5 7
		IV Bombay — AGRICULTURAL RESEARCH GRANTS 1 A Surat Physiological Writing up 2 A Boll worm B Boll worm Propaganda C Writing up 3 A Dharwar Wilt B Writing up 4 Khandesh Cotton Breeding 5 Co-ordination of Cotton Research 6 Jalgaon Cotton Breeding 7 Broad Leaf Disease Survey 8 Small Leaf Disease Survey 9 Survey of Goghar cotton in Bombay Presidency 10 Defoliation of cotton seed in Bombay Presidency V Madras— (a) Herbaceous (b) Ferns and Physiological (c) Fodder Cholam (d) Nadam Cotton Breeding	2 45 139 11 3 5 814 7 8 1 14 509 9 7 91 408 9 2 2 315 3 0 1 82 836 4 11 10 902 10 3 98 573 5 0 1 749 7 6 20 251 5 3 25 006 13 7 4 037 2 0 510 0 0 3 450 0 0 1 12 007 5 8 64 871 12 5 10 235 5 4 4 089 6 8	
Carried over	1 13 54 607 4 9	Carried over	9 26 338 7 3	47 96 372 12 4

BALANCE SHEET AS AT 31st MARCH 1935--cont'd

Receipts	Rs	a	p	Expenditure	Rs	a	p	Rs	a	p
Brought forward	1 13 54	607	4 9	Brought forward	0 0	339	7 3	47 86	372	12 4
				VI Punjab--				4 37	069	0 7
				(a) Botanical				1 56	441	13 4
				(b) Entomological				38	140	5 0
				(c) White Fly				10	5 8	7 9
				(d) Root Rot				10	812	11 3
				(e) Spraying Trials				7	00	0 0
				(f) Defibrating and Delinting				1	810	8 0
				(g) Physiological				1	011	0 0
				(h) Survey of Disease of Malformation				3 44	37	12 6
				VII Central Provinces--				2	20	0 0
				(a) Botanical				1 47	831	1 4
				(b) Entomological				0	32	10 0
				(c) Flyck Boll worms				13	26	319 12 0
				(d) Rohilkhand and Bundelkhand Cotton Survey				1 85	095	0 5
				(e) Institute of Plant Industry Indore				7	000	15 5
				(f) Sind				28	21	7 9
				(g) Burma--				1 54	308	14 4
				(a) Capital				5	815	10 3
				(b) Cotton Improvement				14	174	15 1
				(c) Hyderabad--				31	489	6 9
				(a) Botanical				31	827	15 11
				(b) Cotton Survey				4	751	5 3
				(c) Flyck and Spotted Boll worms				605	0 0	
				(d) Bihar				889	0 0	
				(e) Baroda--						
				(a) Root Rot						
				(b) Comparative Tests						
				(c) Survey of Goghar Cotton						
				(d) Bengal-Cornilla						
				(e) Loans recoverable (that now deferred doubtful) --						
				(1) Co-operative Cotton Sale Society Hubli						
				(2) Co-operative Cotton Sale Society Gadag						
				Suspense account						
				By Balance						
Total	1 13 54	607	4 9	Total	7 69	12 8		14 90	12 8	
					7 202	0 0		1 005	1 10	
								26 35	431 9 0	
								1 13,54	607 4 9	

BALANCE SHEET AS AT 31st MARCH 1935

Provident Fund Account

RECEIPTS	Rs	a	p	Rs	a	p	EXPENDITURE	Rs	a	p	Rs	a	p
Subscribers contributions	1 02	565	5 4				By Advances to subscribers	31 911	3 0				
Less—Payments made to subscribers resigned	40 189	13 3		1 22 375	8 1		Less—Recoveries made upto 31st March 1935	27 696	12 0		4 214	7 0	
Committee's contributions	1 59 010	11 7					Accrued interest on Government Paper credited to subscribers account						156
Less—Payments made to subscribers resigned and forfeitures to the Committee and to the Lapses and Forfeitures account	38 002	1 8		1 21 008	9 11		By Balance				2 209	4 0	
Suspense Deposit of Mr Dutt's own contributions with interest	1 008	3 3									2 64 489	10 7	
Suspense Receipts (Provident fund amount of Mr Aziz Ahmed	224	7 6											
Investment Fluctuation account				1 230	10 9								
Lapses and Forfeitures account				25 719	4 5								
				579	4 5								
Total				2 70 913	5 7		Total				2 70 913	5 7	

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st MARCH 1935

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Receipts	Rs. a. p.	PAYMENTS	Rs. a. p.	Rs. a. p.
<p>Opening Balance</p> <p>Receipts under Section 12 of the Indian Cotton Cess Act, 1923</p> <p>Other Receipts</p> <p>Interest on Investments</p> <p>Includes Rs. 4,724.70 on account of Sink Fund and Rs. 15,555.93 against loans recoverable from Hobil and Gadag Co-operative Cotton Sale Societies</p> <p>Includes Rs. 1,119.11-0 against provision for Sinking Fund for the year 1934-35.</p>	<p>27 40 059 14 7</p> <p>7 53 553 14 1</p> <p>8 487 1 8</p> <p>1 31 912 5</p>	<p>Administration of the Committee, (including Improvement of Cotton Marketing Seed Distribution and Externs on Printing and Propaganda and Statistical Research)</p> <p>Agricultural Research Grants in Aid</p> <p>Technological Research</p> <p>Closing Balance (Government Paper at cost) —</p> <p>31% Government Promissory Notes of the face value of Rs. 7,06,300</p> <p>31% Government of India Loan 1947-50 of the face value of Rs. 2,75,000</p> <p>41% Government of India Loan 1940-70 of the face value of 10,01,000</p> <p>41% Government of India Loan 1935-40 of the face value of 24,600</p> <p>5% Government of India Loan 1939-44 of the face value of 2,69,000</p> <p>6% Bombay Municipal Bonds 1951 of the face value of 50,000</p> <p>6% Karamad Fort Trust Coupon Debentures 1933 of the face value of 50,000</p> <p>6% Rangoon Municipal Debentures 1956 of the face value of 1,30,000</p> <p>31% India Sterling Bearer Bonds of the face value of 3,83,500</p> <p>31% India Sterling Bearer Bonds of the face value of 2,20,088 14 10</p> <p>(Market value on 31st March 1935 Rs. 31,35,201-5 6)</p> <p>Imperial Bank of India Current Account</p> <p>Imperial—Committee's Accounts as certified by the Secretary</p> <p>Technological Laboratory, as certified by the Director</p> <p>High Commissioner for India London for scholarship (£100)</p> <p>Deposit with Agricultural Bank for 10 Reserve Bank Shares</p> <p>Suspense (Recoverable)</p> <p>Loans Recoverable (but some dated doubtful)</p> <p>**Total Closing Balance</p>	<p>4 43 583 2 6</p> <p>2 18 032 13 0</p> <p>9 08 245 8 10</p> <p>25 001 0 0</p> <p>1 88 661 3 6</p> <p>66 600 0 0</p> <p>1 41 212 8 0</p> <p>4 15 325 2 0</p> <p>2 20 088 14 10</p> <p>20 15 095 4 7</p> <p>15 09 10 9</p> <p>3 35 10 5</p> <p>1 000 0 0</p> <p>1 663 1 10</p> <p>14 9 0 12 6</p>	<p>4 02 592 12 5</p> <p>4 00 760 13 6</p> <p>1 03 403 1 9</p>
Total	56 23 643 3 11	Total	56 23 643 3 11	

*1% Government of India Loan 1940-70 of the Face Value of Rs. 1,16,000 has been deposited with the Imperial Bank of India for security against any overdraft that may be required by the Committee

**This includes Rs. 5,818-2-0 on account of Provision for Sinking Fund

We have examined the above Statement of Receipts and Payments of the Indian Central Cotton Committee with the Books Vouchers and Certified Returns of the Committee, have obtained all the information and explanations we have required and certify that in the best of our information and explanations received the above Statement is a correct abstract of the figures appearing in the Books and is drawn up in conformity with the Rules under the Indian Cotton Cess Act, 1923.

(Sd) S B BULLMORIA & Co
Registered Accountants Auditors

Bombay 30th April 1935.

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UP TO MARCH 31st 1935

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Major Heads	Total sanctioned grant	Period.	Date of starting of work	Total expenditure up to 31st March 1935	Expenditure from Capital Grants on			Expenditure from annual grants on apparatus and equipment of permanent or semi permanent nature	Net working expenses of staff, field experiments, labour stores, laboratory and field contingencies including petty apparatus	Remarks
					(a) Lands and buildings	(b) Machinery apparatus and other moveable property	(c) Schemes			
1	2	3	4	5	6	7	8	9	10	
11 Technological Research— (1) Technological Laboratory— (a) Capital Expenditure 15,82,169 15 7 (b) Working Expenses 63,307 3 3 (2) Provincial	Rs a p 5 71 209 3 8 15 82 169 15 7 63 307 3 3	Yrs Mths Permanent	{ 1923 Jan 20 4 Do April 1928	Rs. a p 5,23,927 10 5 15 10 536 5 9 63 397 3 3	Rs a p 3 82 741 10 3	Rs a p 1 39,869 4 7 1 316 11 7	Rs a p 41 313 12 1 3 386 9 0	Rs a p 14 69 022 9 8 60 010 10 3	*Physiological Scheme closed down on 4th August 1932 and Writing up Scheme closed down on 17th October 1933	
AGRICULTURAL RESEARCH GRANTS 1V Bombay Scheme— (1) Surat Physiological and Writing up (2) (a) Surat field worm Writing up (b) Propaganda and Clean up (c) Tharapur— (a) W. K. & Cotton Breeding	2,01,445 0 0 1 20 20 0 0 2 420 0 0 1 28 764 0 0 2 83 545 0 0	10 1 1/2 7 7 0 4 6 0 8 11	Sept 1923 Do July 1932 April 1931 Sept 1923	2 50 954 2 11 1 14 609 9 7 2 315 3 0 91 463 0 2 1 82 896 4 11	Rs a p 3 82 741 10 3	Rs a p 1 39,869 4 7 1 316 11 7	23 334 5 2 4 07 8 7 10 828 0 11	2 27 610 13 0 1 09 802 1 0 2 315 3 0 80 640 8 3	Scheme closed down on 31st March 1931	
(1) Writing-up (1) Khandesh Cotton Breeding	11 335 0 0 27 905 0 0	0 10 5 8	June 1932 Oct. 1906	10 902 10 3 26 573 5 0	Rs a p 13 713 3 7	Rs a p 1 09 123 1 4	10 902 10 3 26 573 5 0	1 09 123 1 4 26 573 5 0	Scheme closed down on 31st July 1932 and in July 1933 Scheme closed down on 31st March 1933	
(1) Peshaw Cotton Breeding (2) Jalore Cotton Breeding (3) Coimbatore of Cotton Research (4) Survey of Small Leaf— Increase of cotton (5) Survey of Long & Cotton in Bombay (6) Fertilisation of Cotton seed in Bombay (7) Recurring Non recurring	85,000 0 0 41,211 0 0 23,991 0 0 5,298 0 0 5,000 0 0 5 0 0 0 3 60 0 0	5 0 5 0 1 0 5 0 3 0 3 0	April 1932 Do. Not to start Nov 1933 Jan. 1935 Not started	25 066 13 7 20 251 5 3 1 749 7 6 4 037 2 0 510 0 0 3 450 0 0	Rs a p 13 713 3 7	Rs a p 1 09 123 1 4	2 658 1 0 751 0 3 495 2 6 510 0 0	22 408 12 7 19 500 5 0 1 749 7 6 3 531 15 6 510 0 0	Scheme closed down on 31st March 1932	

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UP TO MARCH 31st 1935—*contd*

Major Heads.	Total sanctioned grant.	Period.	Date of starting of work.	Total expenditure up to 31st March 1935	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of permanent or semi permanent nature.	Net working expenses for staff field experiments laboratory stores and field contingencies including petty apparatus	REMARKS
					(a) Lands and buildings	(b) Machinery apparatus and other moveable property			
1	2	3	4	5	6	7	8	9	10
VI. Madras Schemes—									
(1) <i>Herbaceous</i>	1 47 000 0 0	14 6	Dec. 1903	1 12 097 5 8	Rs a. p.	Rs a. p.	Rs a. p.	Rs a. p.	
(2) <i>Perennials and Physiological</i>	2 12 779 0 0	7 0	Sept. 1931	64 671 12 5			4 420 10 3	1 07 676 11 5	
(3) <i>Fodder Cereals—</i>							6 234 11 10	58 437 0 7	
(a) <i>Capital</i>	900 0 0								
(b) <i>Recurring</i>	16 800 0 0	5 5	Jan. 1931	10 355 5 4		881 11 7	270 1 11	9 203 7 10	
(4) <i>Nadam Cotton Breeding</i>	13 750 0 0	5 0	June 1933	4 589 6 8			388 14 0	4 200 8 8	
VII. Punjab Schemes—									
(1) <i>Botanical—</i>									
(a) <i>Capital Expenditure</i>	31 330 0 0								
(b) <i>Working Expenses</i>	19 85 650 0 0	14 8	Aug. 1925	4 57 968 0 7	22 158 0 0	9 102 11 0	31 484 2 4	3 75 223 3 3	†Rs 2 030 transferred to Capital from Working grant.
(2) <i>Entomological—</i>									
(a) <i>Capital Expenditure</i>	6 000 0 0								
(b) <i>Working Expenses</i>		10 31	May 1926	1 56 441 12 4		6 826 3 10			
(c) <i>Plant and Spotted</i>									
(d) <i>Leaf Worms</i>	3 40 410 0 0								
(e) <i>White Fly</i>	56 087 0 0	4 11	May 1931	23 149 5 0			8 985 1 0	1 41 630 8 6	
(f) <i>Root Rot</i>	42 508 0 0	6 0	Sept 1932	20 578 3 9			9 245 15 6	24 903 5 6	
(g) <i>Swarming Thrips</i>	14 400 0 0	2 0	July 1933	10 812 11 3			91 14 6	10 486 5 3	
(h) <i>Physiological</i>	1 48 833 0 0	5 0	March 1935	1 919 8 0			3 028 5 3	7 781 6 0	
(i) <i>Dehydration and Delineating</i>								1 919 8 0	
(j) <i>Recurring</i>	1 000 0 0			1 000 0 0				1 000 0 0	
(k) <i>Non-recurring</i>	6 700 0 0			6 700 0 0					
(l) <i>Survey of disease of mal formation</i>	2 574 0 0	1 0	June 1934	1 911 0 0			2 5 872 10 0	1 911 0 0	†Rs 827-4-0 since refunded.
VIII. Central Provinces—									
(1) <i>Botanical</i>	1 181 000 0 0	2 6	Oct. 1923	3 44 737 12 8			4 605 12 10	3 40 131 15 8	††The balance of this amounting to Rs. 3 100 13-6 is paid on revision.
(2) <i>Entomological</i>	5 54 560 0 0	13 0	July 1934	2 220 0 0			84 2 0	2 155 14 0	

I C SEED DISTRIBUTION AND EXTENSION SCHEMES

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1	Mr. or Messrs.	Total sanctioned grant.	Period.	Date of starting of the Scheme.	Total expenditure up to 31st March 1935.	Expenditure from Capital Grants on		Expenditure from annual grants on equipment or permanent semi permanent nature	Net working expenses for staff field experiments stores laboratory and field contingencies including petty apparatus.	REMARKS
						(a) Lands and buildings	(b) Machinery apparatus and other movable property			
		Rs.	Yrs.	Mths.	Rs.	Rs.	Rs.	Rs.	Rs.	
1. Bombay— (i) High (ii) Caring (iii) Gading Supplementary (iv) Haver (v) Athani (vi) Pambhani (vii) Surat		20 110 0 0	6	0	June 1930	3* 445 7 3				
		54 515 0 0	6	0	Do	33 076 10 0				
		21 448 0 0	4	0	June 1931	20 188 10 6				
		27 52 0 0	5	0	April 1932	11 786 6 11				
		46 757 0 0	5	0	April 1930	35 243 3 1				
(vi) Khandesh (ii) Irrigan Canals (Bullitt) (i) I. D. 8 Cotton		22 340 0 0	5	0	May 1931	1 19 371 12 5				
		23 800 0 0	5	0	April 1931	3 505 10 3				
		10 460 0 0	3	0						
2. Madras— (i) Pay and allowances of the business Manager (ii) Co. 2 (iii) H. 1 (iv) Sanjiv-Lyallpur Glassery (v) Hyderabad State (vi) Central Provinces (vii) Verum Cotton (viii) Extension of long staple and marketing of Verum Cotton (ix) Travels (x) Limited Producers—C. 405		1 050 0 0	5	0	May 1931	13 026 15 0				
		81 310 0 0	5	0	Sept 1932	15 132 12 4				
		18 860 0 0	(i) 2	0	May 1933	3 952 2 9				
		18 125 0 0	8	0	April 1931	18 038 3 3				
		2 80 640 0 0	6	0	March 1930	1 33 913 12 11				
(i) Verum Cotton (ii) Extension of long staple and marketing of Verum Cotton (iii) Travels (iv) Limited Producers—C. 405		3* 400 0 0	3	8	Sept. 1930	23 951 12 1				
		1 17 900 0 0	3	0	Sept. 1930	73 644 2 5				
		1 25 525 0 0	3	0	April 1934	30 235 0 0				
		23 600 0 0	5	0	Do	8 117 4 0				
		43 900 0 0	5	0	May 1935					

APPENDIX VII.

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS

(Based on Returns made under the Indian Cotton Cess Act, 1923 by Mills in British India and on Voluntary Returns from or Yarn Production figures of Mills in Indian States)

Cotton Year 1st September to 31st August

(In Bales of 400 lb Nett)

	1923 24	1924 25	1925 26	1926 27	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35
Dombay Island	762 610	987 355	737 937	747 939	435 428	510 036	788 375	664 546	611 006	568 084	491 709	687 287
Almoralad	292 745	273 639	286 800	264 139	208 075	318 993	344 021	321 503	322 257	348 009	373 315	326 529
Dombay Presidency	1 180 410	1 424 447	1 189 539	1 167 892	894 671	1 044 925	1 300 859	1 173 649	1 132 645	1 116 297	1 083 549	1 230 616
Madras	149 721	162 876	176 274	185 207	194 591	204 384	211 488	214 759	260 707	230 013	278 080	312 164
United Provinces	169 522	177 064	194 740	204 702	179 846	182 462	231 005	235 623	258 800	273 573	277 200	292 424
Central Provinces and Berar	94 635	106 052	109 995	111 292	116 888	121 391	123 146	118 492	115 018	111 008	112 660	125 014
Bengal	72,535	83 553	77 949	89 763	82 088	84 212	90 075	91 993	102 200	103 784	107 633	101,101
Punjab and Delhi	23 388	30 063	35 394	40 637	45 039	54 575	64 464	73 736	89 681	80 851	71 939	83 897
Rest of British India	12,227	14 414	17 313	13 100	15 040	22 189	24 458	27 101	30 342	31 935	35 139	38 575
Total—British India	1 693 438	1 999 009	1 798 204	1 812 733	1 610 760	1 714 038	2 037 025	1 935 393	1 987 603	2 009 661	1 946 210	2 163 791
Total—Indian States	142 505	175 609	187 614	229 443	251 589	277 540	316 293	332,906	358 793	351 200	350 116	428 341
Total—India	1 835 943	2 174 618	1 985 818	2 042 176	1 771 249	1 991 578	2 353 318	2 268 299	2 346 396	2 360 861	2,336 326	2 612 132

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES
(Based on Voluntary Returns from or Turn Production figures of Mills in Ind in States)
Cotton Year 1st September to 31st August
(In Bales of 400 lb Nett)

	19 6 7	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35
Hyderabad	15 210	16 027	19 067	20 873	23 074	31 700	33 483	33 731	45 583
Mysore	43 571	44 370	39 619	46 590	43 370	49 703	50 500	47 103	61 100
Bombay	46 070	46 881	48 852	50 013	60 578	59 531	50 587	53 612	57 140
Coastal	21 237	25 716	36 703	41 403	45 207	43 892	43 300	49 302	50 318
Indore	53,576	65 391	76 070	83 076	89 670	95 206	91 036	111 430	114 229
Kashmir States					20 283	18 810	18 568	20 508	35 438
Other Indian States					30 858	30 347	40 209	43 167	43 735
Pondicherry	46,809	52 581	57 774	61 454	18 350	20 257	23 170	23 610	22,601
Total	279 443	251 589	277 510	315 399	333 908	368 793	351 250	360 116	428 311

LOOSE (UNPRESSED) INDIAN RAW COTTON RECEIVED IN SPINNING MILLS IN BRITISH INDIA

(Based on Voluntary Returns furnished by Mills)

Cotton Year 1st September to 31st August

(In Bales of 400 lbs Nett)

	1926 27	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35
Bombay	28 328	24 970	27 321	24 361	54 409	74 979	80 092	74 863	58 355
Madras	35 105	39 560	52 188	46 532	55 717	90 389	98 310	110 875	123 200
United Provinces	16 991	10 308	13,878	20 441	18 498	14 367	19 256	17 871	10 090
Central Provinces and Berar	40 762	20 861	6 924	16 213	15 771	20 743	17 462	18 382	20 644
Punjab	3,010	4 739	3 700	4 361	4 307	2 317	2 149		5 535
Total	123,162	100 438	101 074	111 983	148 700	211 793	215 270	221 906	217 784

APPENDIX VIII.

STOCKS OF INDIAN RAW COTTON HELD IN INDIA BY THE MILLS
AND THE TRADE ON 31st AUGUST, 1934 & 1935.
(In thousand bales* of 400 lb each)

Trade Descriptions of Cotton.	TRADE STOCKS ON 31st AUGUST								MILL STOCKS ON 31st AUGUST		Total Indian Trade and Mill Stocks on 31st Aug	
	Bombay Island		Karachi		Rest of India		Total India		Total India		1934	1935
	1934	1935	1934	1935	1934	1935	1934	1935	1934	1935		
BENGALS—												
United Provinces	—	—	—	—	(a) 16	(a) 9	18	9	20	23	36	32
Punjab	—	—	64	27	(b) 8	(b) 4	72	31	10	8	82	89
Sind	—	—	51	14	—	—	61	14	4	3	65	17
Rajputana	—	—	3	1	(c) 1	(c) 1	3	2	17	15	20	17
Others (Unclassified)	90	65	—	—	(c) 1	(c) 1	90	66	3	3	93	69
Total	90	65	118	42	24	15	232	122	54	62	286	174
OMRAS—												
Central Provinces Oomras	21	19	—	—	(d) 1	(d) 15	22	24	27	32	49	56
Barar Oomras	60	24	—	—	(e) 15	(e) 14	75	38	16	11	91	49
Khandesh—Banilla	—	—	—	—	—	—	—	—	6	13	6	13
Khandesh Oomras	45	19	—	—	(f) 4	(f) 4	45	23	16	15	61	38
Central India—Malva	—	—	—	—	—	—	—	—	22	18	22	18
Central India—Others	36	14	—	—	(g) 7	(g) 4	43	18	12	10	55	28
Barar and Nagar Oomras	26	14	—	—	(h) 1	(h) 4	27	18	7	11	34	29
Total	188	90	—	—	24	31	212	121	106	110	318	231
VERUM 282	—	—	—	—	—	—	—	—	10	6	10	6
HYDERABAD GAORANI	1	—	—	—	(A) 27	(A) 10	28	10	67	63	95	62
Total	1	—	—	—	27	10	28	10	77	69	105	68
AMERICANS—												
Punjab—289 F	—	—	—	—	—	—	—	—	10	6	10	6
Punjab (Unspecified—4 F)	7	13	34	30	(b) 6	(b) 23	47	75	60	44	107	119
Sind—289 F	—	—	—	—	—	—	—	—	6	10	7	17
Sind (Unspecified—4 F)	2	17	6	4	—	—	8	21	13	19	21	40
Dharwar (Gadag 1)	—	—	—	—	—	—	—	—	3	6	3	6
Dharwar (Upland—Unspecified)	—	—	—	—	—	—	—	—	3	1	3	1
Cambodia (Cumbatore No 2)	—	—	—	—	—	—	—	—	55	61	55	61
Cambodia (Unspecified)	20	9	—	—	—	—	20	9	33	35	53	44
Total	29	39	42	50	6	23	77	112	182	182	259	294
BROACH—												
Surat Navsari (Surati)	6	8	—	—	—	—	6	8	56	26	62	34
Broach (Unspecified)	76	22	—	—	(c) 4	(c) 6	80	28	49	80	129	58
Total	82	30	—	—	4	6	86	36	105	56	191	92
DHOLLERAS—												
Matthoo	28	18	—	—	—	—	28	18	2	5	30	23
Cutch	—	—	—	—	—	—	—	—	1	2	1	2
Wagad	—	—	—	—	—	—	—	—	42	32	42	32
Dhollerias (Unspecified)	46	27	—	—	(e) 8	(e) 7	54	34	10	10	64	44
Total	74	45	—	—	8	7	82	62	55	49	137	101
SOUTHERNS—												
Kumtias (Jayawant)	—	—	—	—	—	—	—	—	19	20	19	20
Kumtias (Unspecified)	—	—	—	—	—	—	—	—	64	51	64	51
Westerns (Jowari and Mungari)	56	22	—	—	(f) 9	(f) 3	56	34	50	42	125	104
Northerns	—	—	—	—	(g) 14	(g) 14	—	14	19	23	3	19
Cocanadas (& Warangal)	—	—	—	—	—	—	—	—	15	20	15	20
Karunganni	3	6	—	—	—	—	3	6	30	24	33	30
Tinnevelles	—	—	—	—	—	—	—	—	3	2	3	2
Salera	33	14	—	—	—	—	33	14	—	—	33	14
Unclassified	—	—	—	—	—	—	—	—	—	—	—	—
Total	92	42	—	—	26	27	65	62	203	192	223	200
COMILLAS	—	—	—	—	—	—	—	—	—	—	—	—
BUMRAS (Wagale & Wagyi)	—	1	—	—	—	—	—	1	3	—	3	2
OTHER SORTS (Unclassified)	6	10	1	—	1	—	8	10	4	—	12	10
Total Indian Cotton	562	322	181	92	94	119	817	832	740	700	1,606	1,332

* Standard Indian bales of approximate average gross weight 400 lb., and net weight 392 lb. of cleaned (lint) cotton.
N.B.—Detailed Statement of Mill stocks on the 31st August 1935, is attached.

- (a) At Calcutta.
(b) In the Punjab.
(c) At Ahmedabad.
(d) In the Central Provinces.
(e) In Barar.
(f) In E & W Khandesh districts.
(g) In Indore and Gwalior States.
(h) In Hyderabad State.
(i) Includes 6-1/2 bales held at Ahmedabad.
(j) In the Madras Presidency.

STOCKS OF RAW COTTON HELD BY THE

(Compiled from Voluntary

(In thousand bales*)

Trade Descriptions of Cotton.	Bombay Island	Ahmed abad	Rest of Bombay Pres dency	Total Bombay Presidency	Madras North	Madras South	Total Madras Presidency	United Provinces	Central Provinces.	Berar	Total C. P. & Berar	Bengal.
BENGALS—												
United Provinces	12	—	—	12	—	—	—	10	1	—	1	2
Punjab	12	—	—	12	—	—	—	1	—	—	—	1
Sind	—	—	1	1	—	—	—	—	—	—	—	—
Rajputana	—	—	—	—	—	1	1	—	—	—	—	—
Others	—	—	—	—	—	—	—	—	—	—	—	—
Total	11	—	1	12	—	1	1	11	1	—	1	3
OMERAS—												
Central Provinces Omeras	4	—	1	5	—	1	1	1	20	1	21	3
Berar Omeras	12	1	—	13	—	—	—	2	—	—	2	1
Khandesh—Banulla	—	—	13	13	—	—	—	—	—	—	—	—
Khandesh Omeras	4	—	8	12	—	—	—	1	1	—	2	—
Central India—Malvi	2	3	—	5	—	—	—	1	—	—	—	—
Central India—Others	3	—	—	3	—	—	—	2	1	—	1	—
Barsi and Nagar Omeras	1	—	4	5	—	—	—	—	—	—	—	—
Total	16	4	26	46	—	1	1	6	25	5	30	4
VERUM 202	1	—	—	1	—	—	—	—	3	1	4	—
HYDERABAD GAORANI	7	—	10	20	6	—	6	—	9	1	10	—
Total	8	—	19	27	6	—	6	—	12	2	14	—
AMERICAN—												
Punjab—280 F	5	—	—	5	—	—	—	—	—	—	—	—
Punjab (Unspecified—4 F)	5	—	1	6	—	7	7	23	—	—	—	3
Sind—280 F	7	1	—	8	—	—	—	—	—	—	—	1
Sind (Unspecified—4 F)	3	—	1	4	—	12	12	—	—	—	—	1
Dharwar (Gadag 1)	3	1	1	5	—	1	1	—	—	—	—	—
Dharwar (Upland—Unspecified)	—	—	1	1	—	—	—	—	—	—	—	—
Cambodia (Counbatore No. 2)	8	—	—	8	—	46	48	—	1	1	2	2
Cambodia (Unspecified)	16	1	—	17	32	11	13	—	—	—	—	1
Total	47	3	4	54	4	77	81	22	1	1	2	8
BROACH—												
Surat Navsari (Surti)	7	10	1	18	—	—	—	—	1	—	1	—
Broach (Unspecified)	12	13	2	27	—	1	1	—	—	—	—	1
Total	19	23	3	44	—	1	1	—	1	—	1	1
DHOLLERAS—												
Mattheo	4	—	—	4	—	—	—	—	—	—	—	—
Cutch	—	2	—	2	—	—	—	—	—	—	—	—
Warad	2	21	1	24	—	—	—	—	—	—	—	—
Dhollerias (Unspecified)	7	3	—	10	—	—	—	—	—	—	—	—
Total	14	26	1	41	—	—	—	—	—	—	—	—
SOUTHERNS—												
Kumtias (Jayawant)	10	1	2	13	5	—	5	—	—	—	1	—
Kumtias (Unspecified)	16	1	10	27	8	—	8	—	1	—	—	1
Westerns (Jowari and Mangari)	12	2	6	20	7	—	7	—	—	—	—	1
Northern	1	—	—	1	—	—	—	—	—	—	—	—
Cocanadas (& Warangal)	—	1	1	2	20	1	21	—	—	—	—	—
Karunganni	2	1	1	4	—	—	—	—	—	—	—	1
Tinnevelles	2	1	—	3	—	14	14	—	—	—	—	—
Salams	1	—	—	1	—	20	20	—	—	—	—	—
Total	43	9	20	74	41	36	77	—	1	—	1	3
COMBILAS	—	—	—	—	—	—	—	—	—	—	—	—
HUMAS (Wagale & Wagri)	—	—	—	—	—	—	—	—	—	—	—	—
OTHER SOUTHS	—	—	—	—	—	—	—	—	—	—	—	—
Total Indian Cotton	160	64	74	298	51	116	167	39	41	8	49	19
AMERICANS	24	2	—	26	—	—	—	—	—	—	—	—
EGYPTIANS	8	9	1	18	1	—	1	—	—	—	—	1
PART AMERICANS	18	21	5	44	—	—	—	1	—	—	—	2
OTHERS (Sodas, Mesopotamia, etc.)	6	2	1	9	—	—	—	—	—	—	—	—
Total Foreign Cotton	60	34	7	101	1	—	1	1	—	—	—	3
Grand Total	220	98	81	399	52	116	168	40	41	8	49	22

* Standard Indian bales of approximate average gross weight 400 lb.

MILLS IN INDIA ON 31st AUGUST, 1935.

Returns furnished by Mills)

of 400 lb each)

Punjab and Delhi	Rest of British India	Total British India	Hyderabad	Mysore	Baroda	Gwalior	Indore	Kathiawar States	Other Indian States	Pondicherry	Total Indian States	Grand Total	Trade Descriptions of Cotton.
5	20	25	—	—	—	3	—	—	—	—	3	23	BENGALS—
—	—	—	—	—	—	—	—	—	—	—	—	—	United Provinces
—	11	13	—	—	—	—	—	—	—	—	—	—	Punjab
—	—	3	—	—	—	—	—	—	—	—	—	—	Sind
—	—	3	—	—	—	—	—	—	—	—	—	—	Rajputana
—	—	—	—	—	—	—	—	—	—	—	—	—	Others
6	13	47	—	—	—	3	1	—	1	—	6	52	Total
—	—	31	—	—	—	—	—	—	1	—	1	32	OOMRAS—
—	—	11	—	—	—	—	—	—	—	—	—	—	Central Provinces Oomras
—	—	13	—	—	—	—	—	—	—	—	—	—	Barar Oomras
—	—	15	—	—	—	—	—	—	—	—	—	—	Khandesh—Banilla
—	—	6	—	—	—	1	3	6	—	—	—	—	Khandesh Oomras
—	—	5	—	—	—	—	4	—	—	—	—	—	Central India—Malvi
—	—	6	6	—	—	—	—	—	—	—	—	—	Central India—Others
—	—	—	—	—	—	—	—	—	—	—	—	—	Barar and Nagar Oomras
—	—	87	6	—	1	3	10	—	3	—	23	110	Total
—	—	5	—	—	—	—	—	—	1	—	1	6	VERUM 252
—	—	42	9	—	—	—	1	—	—	—	10	52	HYDERABAD GAURANI
—	—	47	9	—	—	—	1	—	1	—	11	59	Total
1	—	6	—	—	—	—	—	—	—	—	—	6	AMERICANS—
3	—	43	—	—	—	—	—	—	—	—	—	—	Punjab—280 P
—	—	9	—	—	—	—	—	—	1	—	1	44	Punjab (Unspecified 4 1)
—	—	17	—	—	—	1	—	—	—	—	—	10	Sind—280 P
—	—	6	—	—	—	—	—	—	—	—	—	19	Sind (Unspecified 1-4 1)
—	—	—	—	—	—	—	—	—	—	—	—	6	Dharwar (Unsp 1)
—	—	1	—	—	—	—	—	—	—	—	—	—	Dharwar (Unsp 1-4 1)
—	—	—	—	—	—	—	—	—	—	—	—	—	specific 1)
—	—	60	—	1	—	—	—	—	—	—	—	—	Cambodia (Cotton 1st 2)
—	—	31	—	1	—	—	—	—	1	—	—	—	No 2)
—	—	—	—	—	—	—	—	—	—	—	—	—	Cambodia (Unsp 1st 1)
4	2	173	—	2	—	1	—	—	2	4	9	182	Total
—	—	19	—	—	2	1	2	2	—	—	7	28	BROACH—
—	—	23	—	—	—	—	—	—	—	—	2	30	Central (Unsp 1st 1)
—	—	—	—	—	—	—	—	—	—	—	—	—	Broach (Unsp 1st 1)
—	—	47	—	—	2	1	2	2	—	—	9	56	Total
—	—	4	—	—	—	—	—	1	—	—	1	5	Unsp 1st 1
—	—	2	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	25	—	—	2	—	—	—	—	—	7	32	Unsp 1st 1
—	—	10	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	41	—	—	2	—	—	6	—	—	8	49	Total
—	—	19	—	1	—	—	—	—	—	—	1	20	Unsp 1st 1
—	—	38	—	14	1	—	—	—	—	—	15	51	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	28	1	11	—	—	—	—	1	1	14	42	Unsp 1st 1
—	—	24	—	—	—	—	—	—	—	—	4	28	Unsp 1st 1
—	—	3	1	—	—	—	—	—	—	—	2	4	Unsp 1st 1
—	—	19	—	—	—	—	—	1	—	—	1	21	Unsp 1st 1
—	—	24	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	2	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	155	2	29	1	—	—	1	1	3	27	177	Total
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	1	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
10	16	593	17	31	6	8	14	9	8	—	9	102	Unsp 1st 1
—	—	30	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	20	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	47	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
1	—	10	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
1	—	107	—	4	7	—	—	1	—	—	1	11	Unsp 1st 1
—	—	—	—	—	—	—	—	—	—	—	—	—	Unsp 1st 1
21	16	703	17	35	13	8	14	10	8	10	115	215	Total

and net weight 592 lb. of cleaned (lint) cotton.

**STOCKS OF SALFMS 'CAMBODIAS AND TINNEVELLIES HELD IN THE
MADRAS PRESIDENCY, BY THE MILLS AND THE TRADE
ON 31st JANUARY 1935**

(In thousand bales of 400 lb nett)

Trade descriptions of cotton	Mill stocks	Trade stocks.	Total stocks.
Tinnevellies	21	7	28
Salems	10	2	12
Cambodias	42	11	53
Total	73	20	93

APPENDIX IX.

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETIES

(Compiled from Voluntary Returns furnished by Exporters)

1st September 1934 to 31st August 1935

(In thousand bales* of 400 lb. each)

Trade Descriptions of Cotton.	Exported to				
	Europe (excluding United Kingdom and the West)	United Kingdom.	Japan.	China and the East (excluding Japan)	Total Exports
DECCAN—					
United Provinces	5	1	19	2	27
Punjab	184	42	230	42	498
Sind	129	23	42	2	206
Rajputana	11	2	4	1	19
Others (Unclassified)	50	31	24	—	105
Total	379	110	319	47	855
OOMRAS—					
Central Provinces—Oomras	33	21	82	—	141
Barar—Oomras	30	7	224	5	266
Khandesh—Banilla	—	—	2	—	2
Khandesh—Oomras	40	8	172	20	235
Central India—Malvi	10	—	1	—	11
Central India—Others	8	1	41	10	60
Barar and Nagar—Oomras	8	3	62	8	81
Unclassified	23	10	97	—	130
Total	157	45	681	43	926
VERUM 262	—	—	—	—	—
HYDERABAD GAOKANI	1	—	1	—	2
Total	1	—	1	—	2
AMERICANS—					
Punjab—280 F	3	4	—	—	7
Punjab (Unspecified—4 F)	143	126	219	8	496
Sind—280 F	—	1	—	—	1
Sind (Unspecified—4 F)	13	16	14	2	45
Dharwar (Gadag 1)	—	—	3	—	3
Dharwar (Upland—Unspecified)	—	—	2	—	2
Cambodia (Coimbatore No 2)	3	1	—	—	4
Cambodia (Unspecified)	4	4	8	—	16
Total	163	152	246	10	571
BROACH—					
Surat Navsari (Sorti)	8	—	1	—	4
Broach (Unspecified)	46	5	16	—	67
Total	49	5	17	—	71
DHOLLERAS—					
Matthoo	34	2	50	3	89
Cutch	—	—	4	—	4
Wagad	2	—	2	—	4
DHOLLERAS (Unspecified)	3	—	27	—	30
Total	39	2	83	3	127
SOUTHERNS—					
Kumtias (Jayawati)	—	—	1	—	1
Kumtias (Unspecified)	—	—	10	—	10
Westerns (Jowari and Munguri)	7	1	—	1	9
Northern	22	—	—	—	22
Coconadas (and Warangal)	8	9	—	—	17
Karunganni	10	1	6	—	16
Tinnevelly	19	2	27	2	49
Salera	1	—	—	—	1
Total	56	13	43	3	115
COMPLAS	29	7	12	1	49
BURMAS (Wagale and Wagyi)	3	—	4	—	7
OTHER SORTS	12	2	102	6	122
Grand Total	991	236	1,508	113	2,848
Total exports as per official returns from British Indian and Pathiawar Ports—Bales of 400 lb. net					
	991	236	1,508	113	2,848

*Standard Indian bales of approximate average gross weight 400 lb. and net weight 327 lb. of cleaned (541) cotton.

STOCKS OF 'SALFMS' 'CAMBODIAS' AND 'TINNEVELLIES' HELD IN THE
MADRAS PRESIDENCY, BY THE MILLS AND THE TRADE
ON 31st JANUARY 1935

(In thousand bales of 400 lb nett.)

Trade descriptions of cotton	Mill stocks	Trade stocks.	Total stocks
Tinnevellies	21	7	28
Salams	10	2	12
Cambodias	42	11	53
Total	73	20	93

APPENDIX IX.

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETY

(Computed from Voluntary Returns furnished by Exporters)

1st September 1934 to 31st August 1935*

(In thousand bales* of 400 lb. each)

Trade Descriptions of Cotton.	Exported to				Total Exports
	Europe (excluding United Kingdom) and the West	United Kingdom	Japan	China & the Far East (including Japan)	
BURMALES—					
United Provinces	5	1	10	2	27
Punjab	184	42	230	42	498
Sind	122	33	42	2	209
Rajputana	11	3	4	1	19
Others (Unclassified)	50	31	24	—	105
Total	379	110	319	47	855
OMRAS—					
Central Provinces—Oomras	83	21	72	—	176
Berar—Oomras	30	7	244	6	317
Khandesh—Banjia	—	—	2	—	2
Khandesh—Oomras	40	3	172	24	219
Central India—Malvi	10	—	1	—	11
Central India—Others	8	1	41	—	50
Barri and Nagar—Oomras	8	3	62	—	73
Unclassified	23	10	97	2	132
Total	157	45	671	28	801
VERUM 262	1	—	—	—	1
HYDERABAD GAHRANI	1	—	1	—	2
AMR CANS—					
Pun ab—280 F	3	4	—	—	7
Pun ab (Unspecified—4 F)	143	120	29	—	292
Sind—240 F	—	1	—	—	1
Sind (Unspecified—4 F)	13	10	14	—	37
Dharwar (Gadag 1)	—	—	2	—	2
Dharwar (Up and—Unspecified)	3	1	2	—	6
Cambodia (Combattore No 2)	4	4	—	—	8
Cambodia (Unspecified)	—	—	—	—	—
Total	166	152	26	—	344
BROACH—					
Surat Navsari (Surt)	8	—	—	—	8
Broach (Unspecified)	40	5	3	—	48
Total	49	5	3	—	57
DROLLERAS—					
Mattheo	31	2	—	—	33
Catch	—	—	66	—	66
Wagad	2	—	—	—	2
DROLLERAS (Unspecified)	3	—	—	—	3
Total	39	2	66	—	107
SOUTHERNS—					
Kumtias (Jayawant)	—	—	—	—	—
Kumtias (Unspecified)	7	—	—	—	7
Wes erns (Jowari and Munguri)	12	1	—	—	13
Nor therns	8	—	—	—	8
Cocanasdas (and Warangal)	10	9	—	—	19
Karunganni	18	1	—	—	19
Tinnevelles	1	—	—	—	1
Salems	—	—	—	—	—
Total	56	11	—	—	67
COM LLAS	29	7	—	—	36
BURMAS (Wagale and Wagyl)	12	—	—	—	12
OTHER SORTS	891	32	42	4	969
Grand Total	991	32	740	71	1834
Total exports as per official returns from British Indian and Aden Ports—Bales of 400 lb. net					
	991	32	740	71	1834

APPENDIX

RECEIPTS AT MILLS IN INDIA OF
(Compiled from Returns
1st September 1934 to
(In thousand bales*)

Trade Descriptions of Cotton	Bombay Island	Ahmedabad	Rest of Bombay Presidcy	Bombay Presidency	Madras Presidcy	United Provinces	C. P. & Berar	Bengal	Punjab and Delhi	Rest of British India
BENGALS—										
United Provinces	12	—	—	12	—	52	2	12	18	—
Punjab	18	—	2	21	—	5	1	3	24	5
Sind	9	1	2	12	—	—	—	1	—	2
Rajputana	20	—	—	20	—	1	—	—	—	15
Others	5	—	2	7	1	11	—	1	—	—
Total	64	1	7	72	1	69	3	17	42	27
OOMRAS—										
Central Provinces Oomras	23	1	2	26	2	10	37	20	—	—
Berar Oomras	15	—	—	15	—	6	9	4	—	—
Khandesh—Banilla	3	—	13	17	—	—	1	—	—	—
Khandesh—Oomras	17	1	26	44	—	—	9	—	—	—
Central India—Malvi	9	12	2	23	—	6	—	—	—	—
Central India—Others	23	2	5	30	—	21	—	—	—	—
Barsi and Nagar Oomras	4	—	13	17	—	—	1	—	—	—
Total	91	17	61	172	2	43	57	24	—	—
VERUM 202	3	1	—	4	—	—	13	1	—	—
HYDERABAD GAURANI	19	—	40	59	2	—	20	—	—	—
Total	22	1	40	63	2	—	33	1	—	—
AMERICANS—										
Punjab—280 F	12	—	—	12	1	8	—	6	1	—
Punjab (Unspecified—4 F)	18	—	1	19	17	51	—	15	23	4
Sind—280 F	18	2	2	22	—	—	—	1	—	—
Sind (Unspecified—4 F)	16	2	1	19	24	9	—	3	—	—
Dharwar (Gadag 1)	11	1	11	23	—	—	—	—	—	—
Dharwar (Upland—Unspecified)	4	—	3	7	—	—	—	1	—	—
Cambodia (Colombatore No 2)	14	3	1	18	88	1	1	6	—	—
Cambodia (Unspecified)	47	2	—	49	29	1	—	5	—	—
Total	140	10	19	169	159	69	1	37	29	4
BROACH—										
Surat Navsari (Surti)	32	43	4	79	—	—	2	2	—	—
Broach (Unspecified)	83	36	2	121	1	—	—	1	—	3
Total	115	79	6	200	1	—	2	3	—	3
DHOLLERAS—										
Mattheo	18	2	—	20	—	—	—	—	—	—
Cutch	4	5	2	11	—	—	—	—	—	—
Wagad	12	95	2	109	—	—	—	—	—	—
Dhollerias (Unspecified)	23	12	1	36	—	—	—	—	—	—
Total	57	114	5	176	—	—	—	—	—	—
SOUTHERNS—										
Kumtias (Jayawant)	29	2	5	35	3	—	1	1	—	—
Kumtias (Unspecified)	53	2	25	85	3	1	—	1	—	—
Westerns (Jowari and Mungari)	67	13	25	95	14	5	—	6	—	—
Northern	3	6	—	9	20	—	—	1	—	—
Cotanadas (& Warangal)	2	3	1	6	4	—	—	1	—	—
Kurumkani	3	3	1	7	30	—	—	2	—	—
Tinnevelles	5	1	1	7	35	—	—	3	—	—
Salems	4	1	—	5	7	—	—	—	—	—
Total	160	31	58	249	117	6	1	15	—	—
COMILLAS	—	—	—	—	—	—	—	—	—	—
BURMAS (Wagale & Wazgi)	—	—	—	—	—	—	—	1	—	14
OTHER SORTS	—	—	—	—	3	—	—	—	—	—
Total Indian Cotton	652	253	196	1 101	285	187	97	98	71	44
AMERICANS	48	12	1	61	1	—	—	1	—	—
LOVYTIANS	62	40	3	105	2	—	—	3	1	—
EAST AFRICANS	60	98	11	169	1	1	1	10	3	—
OTHERS (Sudan Mesopotamia etc)	23	6	2	30	—	—	—	1	—	—
Total Foreign Cotton	193	155	17	365	4	1	1	15	4	—
Grand Total	845	408	213	1 466	289	188	98	113	75	44
Indian raw cotton consumed in Indian mills (figures compiled mainly from returns under the Indian Cotton Cess Act—Bales of 400 lb net)	687	327	217	1 231	312	292	125	101	84	89

* Standard Indian bales of approximate average

X.

RAW COTTON CLASSIFIED BY VARIETIES

furnished by Mills)

31st August 1935.

of 400 lb each).

Total British India	Hyderabad	Mysore	Baroda	Gwalior	Indore	Kathiawar States	Other Ind an States	Poonj cherry	Total Indian States	Grand Total	Trade Descriptions of Cotton.
96	—	—	—	12	—	—	1	—	13	109	BENGALS—
59	—	—	—	—	—	—	—	—	—	59	United Provinces
16	—	—	—	—	—	—	—	—	—	16	Punjab
36	—	1	—	—	5	—	8	—	18	54	Sind
20	—	—	—	—	—	—	—	—	—	20	Rajolana
											Others
227	—	1	2	14	5	—	9	—	31	258	Total
95	1	—	—	—	—	—	4	—	5	100	OMRAS—
31	—	—	—	—	—	—	—	—	—	31	Central Provinces Omras
18	—	—	1	—	—	—	1	—	2	20	Berar Omras
63	—	—	—	—	—	—	1	1	2	55	Khandesh—Banilla
29	—	—	—	—	—	—	9	—	77	106	Khandesh Omras
51	—	—	—	—	—	—	—	—	37	88	Central India—Malva
18	9	—	—	—	—	—	1	—	10	28	Central India—Others
											Barri and Nagar Omras
298	10	—	5	21	77	—	16	1	133	431	Total
18	—	—	1	—	1	—	—	1	3	21	VERUM 262
81	31	—	—	—	1	—	1	—	33	114	HYDERABAD GAORANI
99	31	—	1	—	2	—	1	1	36	135	Total
28	—	—	—	1	—	—	1	—	2	30	AFRICANS—
131	—	—	—	—	—	—	3	—	5	139	Punjab—289 F
23	—	—	—	—	1	1	—	—	2	25	Punjab (Unspecified—4 F)
55	—	—	—	10	—	—	—	—	12	67	Sind—289 F
23	—	—	1	—	—	—	—	—	1	24	Sind (Unspecified—4 F)
8	—	—	—	—	—	—	—	—	—	8	Dharwar (Gadag 1)
113	—	1	—	—	—	—	3	3	7	120	Dharwar (Upland—Unspecified)
84	—	2	—	—	—	—	2	—	4	88	Cambodia (Colombatore No 2)
											Cambodia (Unspecified)
468	—	3	1	11	1	1	9	7	33	501	Total
83	—	—	4	1	11	6	1	1	23	106	BROACH—
128	—	—	5	—	—	1	1	3	10	136	Surat Navsari (Surat)
											Broach (Unspecified)
209	—	—	9	1	11	6	2	4	33	242	Total
20	—	—	—	—	—	2	—	—	2	22	DHOLLERAS—
11	—	—	—	—	—	—	—	—	—	11	Mattheo
109	—	—	10	—	—	18	2	—	30	139	Cutch
36	—	—	2	—	—	—	—	—	2	33	Wagad
											Dhollerass (Unspecified)
176	—	—	12	—	—	20	2	—	34	210	Total
40	—	12	1	—	—	—	—	—	13	53	SOUTHERNS—
90	—	11	1	—	—	1	2	—	15	105	Kumtias (Jaywant)
120	3	14	—	—	—	—	1	3	21	141	Kumtias (Unspecified)
30	—	2	1	—	—	—	—	1	4	34	Western (Jowari and Mungari)
11	5	—	—	—	—	—	—	—	7	18	Northern
39	—	—	—	—	—	—	1	—	1	40	Coxanadas (& Warangal)
46	—	9	—	—	—	—	—	—	9	55	Karunganni
12	—	—	—	—	—	—	—	—	—	12	Tinnevelles
											Salem
368	8	43	3	—	—	1	4	6	70	458	Total
—	—	—	—	—	—	—	—	—	—	—	COMILLAS
13	—	—	—	—	—	—	—	—	—	13	BURMAS (Wagale & Wagyi)
3	—	—	—	—	—	—	1	—	1	4	OTHER SORTS
1 883	49	52	33	50	96	23	44	19	371	2,254	Total Indian Cotton
63	—	—	—	—	—	—	—	1	1	64	AMERICANS
111	—	6	—	—	—	—	—	—	12	123	EGYPTIANS
185	—	—	—	—	—	1	4	—	27	212	EAST AFRICANS
31	—	—	—	—	—	—	—	1	2	33	OTHERS (Sudan, Mesopotamia, etc.)
390	—	6	29	—	1	4	1	1	42	432	Total Foreign Cotton
2 273	49	53	62	50	97	32	45	20	413	2,666	Grand Total
2,191	45	51	57	56	114	33	46	23	423	2,612	Indian raw cotton consumed in Indian mills. (Figures compiled mainly from returns under the Indian Cotton Cess Act—Bact of 400 lb. net).

... of class of classification.

APPENDIX XI

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1935

INDIAN CENTRAL COTTON COMMITTEE OFFICE			
1	Secretary	Mr P H Rama Reddi M A B Sc I A S	On deputation from Madras Department of Agriculture
2	Deputy Secretary	Vacant	
3	Publicity Officer	Mr R D Mishra M A Agrn (Oxon) Post Grad D p Agrn (Oxon) Post Grad Res B Litt (Oxon)	—
TECHNOLOGICAL LABORATORY BOMBAY			
4	Director	Dr Nazir Ahmad M Sc Ph D (Cantab) F Inst P	Late Head of Science Department Islamia College Lahore and Assistant Director Technological Laboratory Matunga Bombay 17
5	Spinning Master	Mr R P Richardson F T I	Demonstrator (Cotton Spinning) Technical School Oldham 13
6	Senior Research Assistant (Chemist)	Mr D L Sen M Sc Tech (Manch) M Sc (Bom) A I I Sc A I C	Research Student at the Indian Institute of Science and Manchester College of Technology
7	Senior Research Assistant (Physicist)	Mr N Hari Rao M Sc (Calcutta)	Research Scholar Technological Laboratory (Textile Physics)
8	Senior Research Assistant (Physicist)	Mr Ram Saran Koshal M Sc (Punjab)	Research Scholar Technological Laboratory (Textile Physics)
9	Junior Research Assistant (Microscopist)	Mr Amar Nath Gulati M Sc (Punjab)	Imperial Institute of Veterinary Research Mukteswar U P
10	Junior Research Assistant	Mr C Nanjundayya M Sc (Calcutta)	Research Scholar Technological Laboratory (Textile Physics)

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31ST 1935—*contd*

TECHNOLOGICAL LABORATORY BOMBAY—*contd*

11	Jun or Research Assistant	Dr K R Sen D Sc (Dacca)	--	Research Scholar Technological Laboratory and Technological Assistant Lyallpur
12	Statistician and Personal Assistant	Mr V Venkataraman, M A (Madras)		Statistical Assistant Latour Office Government of Bombay Bombay
13	Temporary Chemist	Dr Lavji Thoria Dr Ing (Germany)		—
14	Electrician	Mr Herculano Lobo LEE (V J T I)		—
15	Spinning Assistant	Mr N Iyengar		—
16	Senior Tester	Mr H B Joshi B Sc	--	—
17	Senior Tester	Mr S S Sukthanker LTC (V J T I)		—
18	Junior Tester	Mr K G Deo		—
19	Junior Tester	Mr R G Panvalkar B Sc		—
20	Junior Tester	Mr G D Bhade B Sc		—
21	Junior Tester	Mr K V N Nayar		—
22	Junior Tester	Mr V N Modak B Sc		—
23	Junior Tester	Mr L V Sundaraman B A		—
24	Junior Tester	Mr P S Sambamurthy		—
25	Junior Tester	Mr G J Kharkar B Sc		—
26	Junior Tester	Mr Sasoon Samson B Sc		—
27	Junior Tester	Mr A J Farid	--	—
28	Junior Tester	Mr U K Benegal B A	--	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1935—*cont'd*

TECHNOLOGICAL LABORATORY BOMBAY—*cont'd*

29	Junior Tester	Mr P V Nachane B Sc	—
30	Junior Tester	Mr A B Khan B Sc	—
31	Junior Tester	Mr C S Ramanathan B Sc	—
32	Junior Tester	Mr M R Raut M Sc	—
33	Draftsman	Mr B G Mehta	—
34	Statistical Clerk	Mr R Krishna Iyer	—
35	Statistical Clerk	Mr P K Wagle	—
36	Mechanic	Mr J B Kharas	—

INSTITUTE OF PLANT INDUSTRY INDORE

37	Director	Mr F Keith Jackson N D A (Hons) Dip Agri (Cantab)	Director of Research Department of Agriculture Iraq (1923-30)
38	Geneticist and Botanist	Mr J B Hutchinson M A (Cantab)	Assistant Geneticist and Botanist Trinidad (1926-33)
39	Chemist and Agronomist	Mr Y D Wad M A M Sc (Bombay) A I I Sc	Research Student Indian Central Cotton Committee
40	Extension Officer	Mr Misra Lal Savena L Ag (Cawnpore)	Six years as Assistant Farm Superin- tendent United Provinces Subordi- nate Agricultural Service
41	Farm Superintendent	Mr G C Tambe B Ag (Bombay)	—
42	Plant Breeding Assistant	Mr Kuber Singh B Ag (Bombay)	—
43	Senior Botanical Assistant	Mr R L M Ghose M Sc (Allahabad)	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN FUNDS AS ON AUGUST 31st 1935—contd

INSTITUTE OF PLANT INDUSTRY INDORE—contd

		Research Cotton Committee	Student Indian Cotton Committee	Central
44	Assistant Farm Superintendent	Mr S C Talesara B Ag (Bombay)	—	—
45	Junior Farm Assistant	Mr K M Sumlote B Ag (Nagpur)	—	—
46	Personal Assistant	Mr A N Srivastava M Sc (Lucknow)	—	—
47	Statistical Assistant	Mr V G Panse B Sc (Bombay)	—	—
48	Genetical Assistant	Mr Bholanath M Sc (Punjab)	—	—
49	Junior Plant Breeding Assistant (Temporary)	Mr N S Apte B Ag (Bombay)	—	—
50	Chemical and Agronomical Assistant	Mr I Madhusudan Rao B A (Hons)	—	—
51	Artist	Mr J S Oncar	—	—
		BOMBAY RESEARCH SCHEMES		
		(i) <i>Breach Cotton Breeding Scheme</i>		
52	Cotton Breeder	Mr P L Patel M Sc (Iowa U S A)	On deputation from Bombay Department of Agriculture	—
53	Botanical Assistant	Mr A K Shah B Ag (Bombay)	—	—
54	Pathological Assistant	Mr Y S Kulkarni B Ag (Bombay)	—	—
55	Botanical Assistant	(ii) <i>Jalgaon Cotton Breeding Scheme</i>	On deputation from Bombay Department of Agriculture	—
56	Pathological Assistant	Mr V L Bhosekar B Ag (Bombay)	Research Student Indian Cotton Committee	Central
57	Pathological Assistant	Mr J D Kanadive B Ag (Bombay)	—	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31ST 1935—contd

BOMBAY SEED DISTRIBUTION SCHEMES

		(i) <i>Hubli Scheme</i>	
57	Agricultural Overseer	.. Mr B S Patil B Ag (Bombay) (ii) <i>Gadag Scheme</i>	—
58	Agricultural Overseer	Mr B S Tadsur B Ag (Bombay) (iii) <i>Surat Scheme</i>	—
59	Cotton Assistant	Mr V D Desai	On deputation from Bombay Department of Agriculture
60	Cotton Assistant	Mr V V Patel B Ag (Bombay) (iv) <i>Athans Scheme</i>	Do do
61	Agricultural Overseer	Mr B M Dhurma B Ag (Bombay) (v) <i>Khandesh (Banilla) Scheme</i>	—
62	Cotton Superintendent Amalner	Mr S V Shevde L Ag	On deputation from Bombay Department of Agriculture
63	Agricultural Overseer	Mr R B Nimbalkar B Ag (Bombay)	Do do
64	Superintendent Bhadgaon Farm	Mr D M Kulkarni B Ag (Bombay)	Do do
BOMBAY COTTON FORECAST IMPROVEMENT SCHEME			
65	Provincial Officer	Mr G R Ambekar School Final	On deputation from Bombay Department of Agriculture
SIND PHYSIOLOGICAL RESEARCH SCHEME			
66	Cotton Physiologist Sakrand	Mr B M Dabral MSc (Beaures)	—
67	Sen or Assistant	Dr A M Shaikh MSc (Bombay) Ph D (London) DIC AIC	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st, 1935—*contd.*

SIND PHYSIOLOGICAL RESEARCH SCHEME— <i>contd.</i>				
68	Junior Assistant ..	..	Mr Rustom M Ranju, Dip Ag (Bombay) ..	—
69	Junior Assistant ..	..	Mr H W Mughal, Dip Ag (Bombay) ..	On deputation from Bombay Department of Agriculture.
70	Junior Assistant ..	..	Mr T J Malkani, M Sc (with distinction) (Bombay)	—
71	Statistical Assistant ..	..	Mr S S Chunev, B Sc (Agra)	—
SIND SEED DISTRIBUTION SCHEME.				
72	Cotton Supervisor, Indus Right Bank, Dadu	..	Mr H A Idnani, B Ag (Bombay) ..	Research Student, Indian Central Cotton Committee, on deputation from Sind Department of Agriculture
73	Cotton Supervisor, Indus Left Bank, Murpurkhas	..	Mr Ghulam Mostafa, Practical Experience in Agriculture	On deputation from Sind Department of Agriculture.
74	Senior Assistant to Cotton Supervisor, Indus Left Bank	..	Mr Agha Khan Mahomed, 2 years' Lyallpur Course.	Do do.
75	Senior Assistant to Cotton Supervisor, Indus Right Bank.	..	Mr W P Shahani, B Ag (Bombay) ..	Do do.
76	Junior Assistant to Cotton Supervisor, Indus Right Bank.	..	Mr Lekhraj ..	Do do.
77	Junior Assistant to Cotton Supervisor, Indus Right Bank.	..	Mr W R Shahani ..	—
78	Junior Assistant to Cotton Supervisor, Indus Right Bank.	..	Mr A. M Kureshi ..	—
79	Junior Assistant to Cotton Supervisor, Indus Right Bank	..	Mr Premising T Advani ..	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1935—*contd*

SIND SEED DISTRIBUTION SCHEME—*contd*

80	Junior Assistant to Cotton Supervisor Indus Left Bank	Mr Partabsingh J Bakshi	—
81	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr S A Sidiki Dip Agri (Bombay)	—
82	Junior Assistant to Cotton Supervisor, Indus Left Bank.	Mr K S Tharumal	On deputation from Sind Department of Agriculture
83	Junior Assistant to Cotton Supervisor Indus Left Bank	Mr T T Naraundas	—
84	Junior Assistant to Cotton Supervisor, Indus Left Bank.	Mr Atmaram	—
85	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr Nek Mahomed	—
86	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr Suleman	—

CENTRAL PROVINCES RESEARCH SCHEMES

(i) *Botanical Scheme*

87	Economic Botanist for Cotton ..	.. Mr D N Mahta B A (Oxon) FLS	On deputation from Central Provinces Department of Agriculture
88	Assistant to Economic Botanist for Cotton	Mr S C Roy L Ag., and Post Graduate Pusa.	Do do
89	Assistant to Economic Botanist for Cotton	Mr S S Pande MSc (Punjab)	Research Student Indian Central Cotton Committee
90	Assistant to Economic Botanist for Cotton	Mr D G Sawargsonkar L Ag (Hons)	On deputation from Central Provinces Department of Agriculture
91	Assistant to Economic Botanist for Cotton	Mr D L Janoria L Ag (Hons)	Do do

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935--*contd*

CENTRAL PROVINCES BOTANICAL RESEARCH SCHEME--*contd*

On deputation from Central Provinces
Department of Agriculture

92 Assistant to Economic Botanist for Mr D Y Bhand LAG (Hons)
Cotton

93 Assistant to Economic Botanist for Mr V N Paranjpe BSc
Cotton

(ii) Entomological Scheme

94 Agricultural Assistant Mr M S Paul BAg

COMBINED LONG-STAPLE COTTON AND MARKETING OF VERUM COTTON SCHEMES IN C P AND BERRAR

95 Agricultural Assistant Mr J P Tiwari BAg

96 Agricultural Assistant Mr L. P Khare BAg

97 Agricultural Assistant Mr G N Wardadkar BAg

98 Agricultural Assistant Mr L B Deshpande BAg

99 Agricultural Assistant Mr N B Chuncholkar BAg

100 Agricultural Assistant Mr J N Kelkar BAg

101 Agricultural Assistant Mr G C Tiwari Certificate Course of Agricultural College Nagpur

102 Agricultural Assistant Mr W R Patwardhan BAg

103 Agricultural Assistant Mr K S S Chowdhary BAg

104 Agricultural Assistant Mr L. B Deshpande BAg

105 Agricultural Assistant Mr Mohammad Ishaque BAg

106 Agricultural Assistant Mr N P Konher BAg

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31st 1935—contd.

COMBINED LONG STAPLE COTTON AND MARKETING OF VERUM COTTON SCHEMES IN C P AND BEAR—contd

107 Agricultural Assistant

Mr N K Galande B Ag

—

MADRAS RESEARCH SCHEMES

(i) *Herbaceum Scheme*

108 Senior Assistant

Mr R Balasubramana Ayyar B A B Sc (Ag)

On deputation from Madras Department of Agriculture

109 Junior Assistant

Mr G Seshadri Ayyangar M A

—

110 Junior Assistant

Mr V Ramaswami Mudaliar B A

—

111 Sub-Assistant

Mr D Devas vatham S S L C (Botany) (Intermediate)

On deputation from Madras Department of Agriculture

180

(ii) *Pempheres and Physiological Scheme*

112 B o-Chemist

Dr S Kasinatha Ayyar B A Ph D (London)

On deputation from Madras Department of Agriculture

113 Physiological Botanist

Mr T R Narayana Ayyar B A (Cantab) B Sc (Ag)

Do do

114 Assistant Botanist

Mr K Dharma Rajulu M Sc (Bombay)

Research Student Indian Central Cotton Committee

115 Assistant Botanist

Mr N G Narayanan B Sc (Ag)

—

116 Assistant Entomologist

Mr V Margabandu M A

On deputation from Madras Department of Agriculture

117 Assistant Entomologist

Mr P S Narayanaswami B Sc (Ag)

Do do

118 Assistant Chemist

Mr K Sathianishu B Sc (Ag)

—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31st 1935—contd

MADRAS RESEARCH SCHEMES—contd

(iii) *Jodder Cholam Scheme*

119	Assistant	Mr M R Balakrishnan	BA BSc (Agr)	On deputation from Madras Department of Agriculture
120	Assistant	Mr S Sundaram	BA BSc (Agr)	Do do

(iv) *Breeding of Nadam Cotton*

121	Assistant	Mr R. Krishnamurthy	BSc (Ag)	Do do
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MADRAS SEED DISTRIBUTION SCHEMES

(i) *Pay of Business Manager*

122	Business Manager operative Trading Society Ltd	Mr K Avudanayakam Pillai	SSLC L. Ag	On deputation from Madras Department of Agriculture
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(ii) *Co 2 Scheme*

123	Agricultural Demonstrator	Mr Damodara Prabhu	BSc (Agr)	Do do
124	Agricultural Demonstrator	Mr L Krishnan	BA BSc (Agr)	Do do
125	Agricultural Demonstrator	Mr P P Syed Mohamed	BSc (Agr)	Do do
126	Agricultural Assistant	Mr P N Muthuswami	BSc (Agr)	Do do
127	Agricultural Assistant	Mr T S Lakshmanan	BSc (Agr)	Do do

PUNJAB RESEARCH SCHEMES

(i) *Botanical Scheme*

128	Cotton Research Botanist	Mr Mohd Afzal	BSc (Agr) (Punjab) A I C T A (Trinidad)	Research Student Indian Central Cotton Committee and State Research Scholar On deputation from Punjab Department of Agriculture
129	Assistant to Cotton Research Botanist	Chaudhri Mohammad Akbar	L. Ag	On deputation from Punjab Department of Agriculture

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1936—cont'd

PUNJAB RESEARCH SCHEMES—cont'd

(i) *Botanical Scheme*—cont'd

130	Agricultural Assistant	Mr. Saroop Singh L Ag M Sc (Texas) USA	On deputation from Punjab Department of Agriculture
131	Agricultural Assistant	Bh. Autar Singh B Sc (Agn)	—
132	Agricultural Assistant	Mr Akbar Ali B Sc (Post Graduate)	Research Student Indian Central Cotton Committee On deputation from Punjab Department of Agriculture
133	Agricultural Assistant	Bh Santokh Singh B Sc (Agn)	—
134	Agricultural Assistant	Ch Mohammad Rashid Khan L C Course Munshi Fazil F A (Punjab University)	On deputation from Punjab Department of Agriculture
135	Statistical Assistant	Mr Bhagat Ram Sehgal M A (Punjab)	—

(ii) *Entomological (Pink and Spotted Boll worm) Scheme*

136	Assistant Cotton Entomologist	Mr M Haroon Khan B Sc (Hons) (London) ARCS (London)	—
137	Field Assistant Research Work	Mr Latha Ram B Sc	—
138	Field Assistant Research Work	L. Ganda Ram B Sc F E L	—
139	Field Assistant	Mr Pare Mohan B Sc (Hons) M Sc	—
140	Field Assistant	Mr Manzoor Abbas B Sc (Agn)	—
141	Field Assistant	Mr Ghulam Ullah B Sc (Agn)	—
142	Field Assistant	Mr Dharm Bir Kohli B Sc (Agn)	—
143	Junior Research Assistant	Mr Abdul Ghami B Sc (Agn)	—
144	Statistical Assistant	Mr Prithvi Nath B Sc (Agn)	—

PUNJAB RESEARCH SCHEMES—contd

(iii) *White Fly Scheme*
L Kedar Nath Trehan M Sc (Punjab)

145 Assistant Cotton Entomologist

146 Field Assistant

Mr Hari Chand B Sc (Agn)

(iv) *Root Rot Scheme*

Dr R S Vasudeva B Sc Ph D (London)
D I C (London)

147 Assistant Cotton Mycologist

(v) *Physiological (Periodic Partial Failure) Scheme*

Prof R H Dastur M Sc FLS

148 Plant Physiologist

Dr A V Varadaraja Iyengar D Sc (Madras)
A I D Sc A I C

149 Bio-Chemist

Mr Abdul Ahad B Sc (Agn)

150 Agricultural Assistant

Bh Sach Singh B Sc (Agn)

151 Agricultural Assistant

Mr Ketal Kishan M A

152 Statistician

UNITED PROVINCES ROHILKHAND AND BUNDELKHAND SURVEY SCHEME

Mr Attar Sing L Ag (Cawnpore)

153 Agricultural Inspector

HYDERABAD RESEARCH SCHEMES

(i) *Botanical Scheme*

Rai Sahib Kalidas Sawhney M Sc (Punjab)

154 Cotton Research Botanist

Late Cotton Breeder in the Department of Agriculture Iraq Baghdad

155 Assistant Cotton Research Botanist

Mr D V Narayanayya Dip Agri (Poona)

On deputation from Bombay Department of Agriculture

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st, 1935—*contd.*

HYDERABAD RESEARCH SCHEMES—*contd.*

(i) *Botanical Scheme—contd.*

156 Assistant Cotton Research Botanist Mr V K Bederker, B A. (Madras), B Ag On deputation from H E H. the Nizam's Department of Agriculture.

157. Inspector, Variety Testing Stations .. Mr N R Yardi, B Ag (Bombay) -----

(ii) *Cotton Survey Scheme*

158 Assistant Botanist Mr B B Mulchandani, B Ag (Bombay) On deputation from Bombay Department of Agriculture.

159 Graduate Assistant Mr M A Jaleel, B Sc (Agri) (Coimbatore) -----

(iii) *Hyderabad (Pink and Spotted Boll worm) Scheme*

160 Cotton Entomologist Mr H D Nangpal, M Sc. (Punjab) .. Research Student, Indian Central Cotton Committee and Assistant Entomologist, United Provinces Pink Boll-worm Scheme.

161. Senior Research Assistant Mr N T Nadkerny B Ag (Bombay) Post-Graduate Course in Entomology at Poona Agricultural College -----

162. Junior Research Assistant Mr T E Krishnaswamy B Sc (Agri) (Coimbatore) -----

HYDERABAD SEED DISTRIBUTION SCHEME

163 Inspector Mr M V. Chitnis -----

BARODA ROOT ROT SCHEME.

164 Cotton Breeder Mr M. S Pandya, B Ag (Bombay), B Sc . On deputation from Bombay Department of Agriculture

165 Breeding Assistant Mr A. F. Patel, B Ag (Bombay) -----

166 Mycological Assistant Mr. G. H Desai, B Ag (Bombay) -----

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1935--*concl'd*

BIKANER GANG CANAL SCHEME

Mr Arjan Singh B Sc

167 Cotton Assistant

168 Mechanic

Mr Jagur Singh

Bengal Comilla Cotton Scheme

Mr H K Majumdar M Sc

169 Agricultural Officer

TECHNOLOGICAL ASSISTANTS PAID BY INDIAN CENTRAL COTTON COMMITTEE

170 Under Cotton Specialist Combatore

Mr R L N Iyengar B Sc

Research Student
Cotton Committee

Formerly Jun or Tester at Techno-
logical Laboratory Bombay

185

171 Under Cotton Breeder Dharwar

Mr H R Nayak Inter Science (Madras)

Do do

Mr K G Deo

Research Student Indian Central
Cotton Committee

172 Under Cotton Research Botanist Lyall
pur

Mr Srinagabhushana B Sc (Mysore)

173 Under Deputy Director of Agriculture
Gujarat Surat

Formerly Junior Tester at Techno-
logical Laboratory Bombay

174 Under Botanist Agricultural Research
Station, Sakrand

Mr K. S. Marar B A LL.B

APPENDIX XII.

RESEARCH STUDENTSHIPS

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS.
1923	Sohan Singh Bindra M Sc Honours School (Punjab)	Lyalpur	Cotton Entomology	Punjab Agricultural Department Cotton Research Botanist Punjab Botanical Research Scheme	Late Assistant Entomologist Pink Bollworm Research Scheme Punjab Recently in Agricultural Department Kenya Indian Central Cotton Committee
	Mohammed Afzal B Sc (Punjab)	Do	Cotton Botany (Plant Breeding)	Assistant to Economic Botanist for Cotton Provinces Botanical Research Scheme	Do
	Sheo Shankar Pande M Sc (Punjab)	Nagpur	Do	Reader in Botany Khalsa College Amritsar	Late Senior Mycological Assistant Central Provinces Wilt Investigation Scheme
	Jiwan Singh M Sc (Punjab)	Do	Cotton Mycology	University Lecturer in Botany Calcutta University from 31st January 1929	Held a Senior Research Studentship under Dr M A Sampath kumaran M A Ph D Central College Bangalore and at the Institute of Plant Industry Indore from April 1926 to March 1928
	Habanto Banerji M Sc (Calcutta)	Coimbatore	Cotton Botany		

RESEARCH STUDENTSHIPS—contd

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REMARKS

How now employed

Branch of Cotton Research in which scholarship granted

Where posted on appointment

Name

Year of appointment

Held a Senior Research Studentship at the Institute of Plant Industry Indore, from July 1926 to June 1927

Sind Agricultural Department, Cotton Breeder Sind, Mirpurkhas

Cotton Botany

B B Desai, B Ag (Bombay)

1923

Lecturer in Botany Cotton College, Gaubhati Assam

Do

Atul Chandra Dutta, M Sc (Calcutta)

1924

Senior Research Assistant (Physicist) Technological Research Laboratory Matunga, Bombay

Textile Physics

N. Hari Rao, M Sc (Calcutta)

"

Entomologist, Hyderabad Pink and Spotted Boll worm scheme, Parbhani

Cotton Entomology

H D Nangpal, M Sc, Cawnpore

"

Cotton Physiology

Sant Dabador Singh, M Sc (Benares Hindu University)

"

Cotton Entomology

Vishwa Ram Singh, L Ag (Agricultural College, Cawnpore)

1925

United Provinces Subordinate Agricultural Service

Cotton Botany (Plant Breeding)

Akbar Ali, B Sc (Punjab)

"

Punjab Agricultural Department, Agricultural Assistant Punjab Botanical Research Scheme

Late Research Assistant under the Entomologist to Government United Provinces—Pink Boll worm Investigation Scheme Indian Central Cotton Committee

Late Special Research Assistant Pink Boll worm Investigation, United Provinces Resigned in August 1924 to go to Cambridge for further study Obtained Ph D

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where posted on appointment.	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1925	Kidar Nath Trehan (Punjab)	M Sc Lyallpur	Cotton Entomology	Punjab Agricultural Department Assistant Cotton Entomologist White Fly Investigation Scheme Punjab	Held Senior Research Studentship for study of White Fly problem at Khanawal Indian Central Cotton Committee
	S E Kumana B A (Bombay)	M Sc Technological Research Laboratory Matunga Bombay	Cotton Technology		Technological Assistant Dharwar up to 31st July 1929 Went abroad for further study Indian Central Cotton Committee
	J D Ranadive B Ag (Bombay)	Bom Dharwar	Cotton Mycology	Pathological Assistant Cotton Breeding Scheme Jalgaon Khandesh	Resigned in July 1925
	P K Roy M Sc (Dacca)	Technological Research Laboratory Matunga Bombay	Textile Physics		
	K R Sen M Sc (Dacca)	Do	Do	Technological Assistant Lyallpur	Indian Central Cotton Committee Obtained a Doctorate (D Sc) in 1934 Resigned in August 1946
1926	L N Rao M Sc (Calcutta)	Do	Cotton Microscopy	Lecturer in Botany Central College Bangalore	
	D F Kapadia B A. (Bombay) M Sc (Tech) (Manchester)	Do	Cotton Technology	Head of the Textile Manufactures Department Victoria Jubilee Technical Institute Bombay	Late Senior Research Assistant Assistant Technologist Technological Research Laboratory Matunga Bombay

RESERVE ARCH STUDENTSHIPS—could

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1926	Ram Saran Koshal (Punjab)	M Sc Technological Research Laboratory Matunga Bombay	Textile Physics	Senior Research Assistant (Physicist) Technological Research Laboratory Matunga Bombay	Indian Central Cotton Committee
	M A Shama Iyengar B Ag (Bombay)	Surat	Cotton Physiology	Sind Agricultural Department Senior Assistant to Agricultural Chemist and Soil Physicist Sakrand	Awarded a Training Grant for foreign study in 1933
	Karam Singh Lamba B Sc Honours School (Punjab)	Lyallpur	Cotton Entomology		Resigned in July 1927
	V D Wad M A M Sc (Bombay) A I I Sc	Coimbatore	Cotton Bio chemistry	Chemist and Agronomist Institute of Plant Industry Indore	Indian Central Cotton Committee
	B A Idnani B Ag (Bombay)	Institute of Plant Industry, Indore	Cotton Botany	Sind Agricultural Department Cotton Supervisor Indus Right Bank Sind Seed Distribution Scheme Dadu	Do
	S C Falekara B Ag (Bombay)	Do	Do	Assistant Farm Superintendent Institute of Plant Industry Indore	Do
1927	R Lakshminarasimha Iyer B Sc (Mysore)	Technological Research Laboratory, Matunga Bombay	Cotton Technology	Technological Assistant Coimbatore	Do
	Anant Krishna Thakur, M Sc (Bombay)	Institute of Plant Industry, Indore	Cotton Bio-chemistry	Assistant Chemist Indian Lac Research Association	
	Dev Raj Mehta B Sc Honours School (Punjab)	Lyallpur	Cotton Entomology		Secured Government Scholarship for study abroad and obtained Ph D (Cantab)

RESEARCH STUDENTSHIPS—contd

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1927	Uma Shankar (Allahabad)	M Sc Cawnpore	Cotton Entomology	Asst. Professor of Zoology and Entomology Agricultural College Cawnpore	Obtained Doctorate at Edinburgh
	Shripad Shamrao Rane M Sc (Benares Hindu University)	Institute of Plant Industry Indore	Cotton Physiology	Unemployed	
	Sant Singh Verma M Sc (Benares Hindu University)	Dharwar	Cotton Physiology in connection with Cotton Wilt Investigation		Awarded a Foreign Scholarship by the Indian Central Cotton Committee Obtained Ph D (Lond)
	Lalshmi Narayan Mathur M Sc (Punjab)	Institute of Plant Industry Indore	Cotton Breeding	Crop Botanist Ujjain Gwalior Department of Agriculture	
	Kadaba Rangaswamy M Sc (Calcutta)	Coimbatore	Do	Unemployed	
1928	S Shamser Singh M Sc (Punjab)	Institute of Plant Industry Indore	Cotton Agronomy	Agricultural Officer Bikaner State	
	K Dharmarajulu M Sc (Bombay)	Dharwar	Cotton Mycology	Assistant Botanist Madras Pemphig and Physiological Scheme	Indian Central Cotton Committee
	Piara Mohan B Sc Honours School (Punjab) M Sc	Cawnpore	Cotton Entomology	Field Assistant Parasite Work Pink and Spotted Boll worm Scheme Punjab	Do
	R N Gidwani B Ag (Bombay)	Surat	Cotton Agronomy	Sind Agricultural Department Inspector of Agriculture Eastern Naras Circle Mirpurkhas Madras Agricultural Service	
	M Kant Raj MA B Sc (Agr) (University of Tum)	Institute of Plant Industry Indore	Do		
	C Nanjundayya M Sc (Calcutta)	Research Laboratory Matunga Bombay	Cotton Technology	Junior Research Assistant Technological Research Laboratory Matunga Bombay	Indian Central Cotton Committee

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1929	Srinagabhushana B Sc	Technological Research Laboratory Matunga Bombay	Cotton Technology	Technological Assistant Surat	Indian Central Cotton Committee
	Phu Pratap Singh Bhullar B Sc (Agri) (Punjab)	Madras	Cotton Marketing and Economics	Punjab Agricultural Department	
	Bhai Ajai Singh Gulzar B Sc (Agri) (Punjab)	Do	Do	Do	
1930	Madan Lal Jhotia M Sc (Punjab)	Do	Entomology	Abroad for further study	
	Thak Nath M Sc (Punjab)	Institute of Plant Industry Indore	Cyology and Plant Breeding	Genetical Assistant Institute of Plant Industry Indore	Indian Central Cotton Committee
	Pran Nath Mehra M Sc (Punjab)	Sakranj	Do		Resigned
	Brajendra Nath Bhargava M A (Lucknow)	Lucknow	Cotton Marketing and Economics		
1931	B S Singh B Ag (Bombay)	Surat Gujarat	Do		Resigned
	K R Dube B Ag (Nagpur)	Nagpur	Do	Dist Supervisor Enquiry into the cost of production of Cotton and Sugar cane crops Central Provinces	
	Antokh Singh Jaggi B Sc (Agri) (Punjab)	Madras	Do	Assistant Punjab Botanical Research Scheme	Indian Central Cotton Committee
1935	Doraiswami Ayyar B A B Sc (Agri) (Madras)	Madras	Do	Madras Agricultural Service	
	Krishna Behari Lal M Sc (Cal) Ph D (Edinburgh)	Madras	Cotton Entomology	Research Student	Under training
1931	Sant Singh Verma M Sc (Benares Hindu University)	Imperial College of Science and Technology London	Foreign Research Studentships		Completed training July 1935 Obtained Ph D of London University

RESEARCH STUDENTSHIPS—contd.

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1927	Uma Shankar (Allahabad)	M Sc Cawnpore	Cotton Entomology	Asst Professor of Zoology and Entomology Agricultural College Cawnpore	Obtained Doctorate at Edinburgh
	Shripad Shamrao Rane M Sc (Benares Hindu University)	Institute of Plant Industry Indore	Cotton Physiology	Unemployed	
	Sant Singh Verma M Sc (Benares Hindu University)	Dharwar	Cotton Physiology in connection with Cotton Wilt Investigation		Awarded a Foreign Scholarship by the Indian Central Cotton Committee Obtained Ph D (Lond)
	Lakshmi Narayan Mathur M Sc (Punjab)	Institute of Plant Industry Indore	Cotton Breeding	Crop Botanist Ujjain Gwalior Department of Agriculture	
	Kadaba Rangaswamy M Sc (Calcutta)	Coimbatore	Do	Unemployed	
	S Shamsher Singh M Sc (Punjab)	Institute of Plant Industry Indore	Cotton Agronomy	Agricultural Officer Bikaner State	
1928	K Dharmarajula M Sc (Bombay)	Dharwar	Cotton Mycology	Assistant Botanist Madras Pempheres and Physiological Scheme	Indian Central Cotton Committee
	Piara Mohan B Sc Honours School (Punjab) M Sc	Cawnpore	Cotton Entomology	Field Assistant Parasite Work Pink and Spotted Boll worm Scheme Punjab	Do
	R N Gidwan B Ag (Bombay)	Surat	Cotton Agronomy	Sind Agricultural Department Inspector of Agriculture Eastern Nar Circle Mirpurkhas	
	M Kant Raj M A B Sc (Agr.) (University of Fdn)	Institute of Plant Industry Indore	Do	Madras Agricultural Service	
	C Nanundayya M Sc (Calcutta)	Technological Research Laboratory Matunga Bombay	Cotton Technology	Junior Research Assistant Technological Research Laboratory Matunga Bombay	Indian Central Cotton Committee

RURAL STUDENTSHIPS—continued

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1933	S. N. Venkatramanian B A B Sc (Agri) (Madras)	Calcutta	Cotton Statistics	Madras Agricultural Service	Under training
	C. Jagannatha Rao B A (Madras)		Cotton Physiology	Research Student	
Foreign Training Grants					
1933	M. Taskhir Ahmad B Sc (Agri) (Punjab)	Trinity College Cambridge	Entomology	Assistant Entomologist Imperial Institute of Agricultural Research Pusa	Under training
	G. B. Patel B A (Bombay)	University of California U S A	Cotton Breeding	Research Student	
1934	M. A. Shahnazgar B Ag (Bombay)	Tour in Hungary, England and Egypt	Study of Kalar (alkali) lands and cultivation of superior Egyptian cottons with special reference to soil and environmental conditions	Sind Agricultural Department Senior Assistant to Agricultural Chemist and Soil Physicist	Under training
	Nazir Ahmad M Sc (Punjab)	Imperial College of Science and Technology London	Entomology	Research Student	

Indian Central Cotton Committee in the remarks column indicates a post paid for from one of the Committee's Research Grants

